A COMPARATIVE STUDY OF UREA CREATININE, URIC ACID CONTENT IN MATERNAL AND CORD BLOOD OF NORMAL AND TOXAEMIC PREGNANCY AND ITS SIGNIFICANCE IN RELATION TO FOETAL OUTCOME

THESIS

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C E R T I F I C A T E

This is to certify that the work entitled "A COMPARATIVE STUDY OF UREA, CREATININE, URIC ACID CONTENT IN MATERNAL AND CORD BLOOD OF NORMAL AND TOXAEMIC PREGNANCY AND ITS SIGNIFICANCE IN RELATION TO FOETAL OUTCOME" which is being submitted as a thesis for M.S. (OBSTETRICS AND GYNAECOLOGY) by DR. SANGITA KHANNA has been carried out under my direct supervision and guidance in the Department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi.

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A C K N O W L E D G E M E N T

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Dated :

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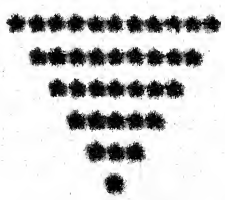
C O N T E N T S



I N T R O D U C T I O N

INTRODUCTION

Toxaemia of pregnancy is one of the most formidable risks of child bearing. In addition to increasing maternal morbidity and mortality, toxaemia of pregnancy is a major factor responsible for foetal loss. The severity of disease directly affects the perinatal mortality. The etiology and prevention of toxaemia of pregnancy have attrated the attention of many workers but despite extensive work, it continues to be the 'Obstetrician's dilemma'.

Incidence of pre-eclampsia a rural India varies from 7-10 percent. In general it may be stated that incidence of preeclampsia in developing countries is nearly similar to the highly industrialized world, but the incidence of severe varieties is much higher in developing countries due to lack of antenatal care.

Toxaemia of pregnancy also contributes to a great extent towards foetal wastage, and nearly one third of premature births of known causes are due to pre-eclampsia and eclampsia.

Eclampsia is a serious obstetric condition which is associated with increased perinatal morbidity and death. Most perinatal deaths are related to prematurity, intrauterine

growth retardation and abruptio placentae. Low birth weight infants (premature and/or small for gestation) are highly susceptible to intrapartum hypoxia, trauma and present numerous neonatal problems.

In the recent past, haemorrhage, sepsis and toxaemia were labelled as most important causes of maternal death; with the advent of antibiotics, with better management of labour, availability of blood transfusion, haemorrhage and sepsis do not continue to be as serious a problem as before, considerable advance has been made in the treatment of toxaemia with resultant reduction in mortality. However, mortality continues to be high specially when the treatment is not institutional.

Hence, it is apparent from the above that for the reduction of an overall maternal mortality and improvment in maternal health, reliable and easy methods to diagnose toxaemias early and if possible, to grade their severity, is essential.

Hitherto the diagnosis was made on the conventional trio of edema, hypertension and albuminuria. At least two of these three are usually present as a constant companion of toxaemia. However, it would be an exaggeration to say that either they are specific or sensitive enough to

foretell the degree of toxaemia. In early stages it is often difficult to differentiate preeclampsia from other conditions not peculiar to pregnancy, like essential hypertension, primary renal disease and congestive heart failure, which may have very similar presenting symptoms.

This has lead to an extensive search for some simple and reliable laboratory test for substantiating the diagnosis of preeclampsia. The tests should be reliable, simple, sensitive, diagnostic and should have prognostic value. Cadden and Stander (1939) were the first to point out that the disturbed physiology during toxaemia is associated with changes in blood chemistry, which when detected early could be used as diagnostic criterian.

Whether the kidney plays a primary or secondary role in the etiology of toxaemia of pregnancy is not known, but some derangement in renal function is certainly responsible for a part of the toxaemic process. In a series of renal clearances, during normal pregnancy, a significant decrease from the elevated glomerular filtration rate noted in the first trimester began early in the second trimester and persisted through the remainder of pregnancy.

A number of constituents of blood have been examined in normal and toxaemic patients, but none seems to answer the question completely, though estimations of

blood urea, non protein nitrogen and uric acid are of considerable value. Mundel (1930) states that blood uric acid is increased in normal pregnancy while Doris (1924), Stander and Cadden (1939) claimed reduction. However, Lancet and Fisher claimed that uric acid is increased in cases of toxaemia of pregnancy and is proportionate to severity in preeclamptic toxaemia.

It is evident that toxaemia of pregnancy is not always manifested with conventional triad and in occasional cases the blood pressure may remain normal until eclampsia supervenes. Urea is most important end product of protein metabolism and depends for its excretion on adequate renal function. It is therefore not surprising that this product may be raised in blood in cases of toxaemia of pregnancy and its serial estimation may reflect kidney function in toxaemia.

The urea content of the amniotic fluid has been investigated by a number of workers in the past who found its level in the amniotic fluid to be higher than that of maternal and cord blood. Hutchison et al (1962) investigated the distribution and metabolism of carbon labelled urea between maternal and foetal bloods but the transfer to the amniotic fluid was appreciably slower. McKay and Kilpatrick

(1964) have observed maternal and infant plasma urea at delivery and have shown that the urea concentration in umbilical venous plasma of non toxaemic pregnancy was raised when birth weight was below average for the gestation period. Dieckmann (1952) states that the maternal blood urea nitrogen is not raised in mild or moderate pre-eclamptic toxaemia but that it may be elevated in severe ones.

The present study is undertaken with following aims and objectives :-

1- To study and to compare the prognostic values of blood urea, serum creatinine and serum uric acid in normal and toxaemia of pregnancy.

2- To study the significance of cord blood urea, creatinine and uric acid in relation to foetal outcome.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Folin (1919) and Caldwell, W.E. and Lyle, W.G. (1921) first reported lowered urea nitrogen and non protein nitrogen in pregnancy as compared to normal non pregnant females.

In another study Stander et al (1932) studied various kidney function tests in the differentiation of the toxaemias of pregnancy. They studied various clearance tests and concluded that urea clearance, guanidine and creatinine excretion tests were of real value in differentiating between mild nephritis and mild toxaemias of pregnancy. They recommended the urea clearance and creatinine excretion tests for routine use in all cases of toxaemia of pregnancy, where the diagnosis was not clear. A urea clearance below 80 percent of the mean normal and a creatinine excretion below 155 mg in the first hour are strongly indicative of renal damage.

Stander, H.J. and Cadden, J.F. (1934) studied blood chemistry in pre-eclampsia and eclampsia. They observed that non protein nitrogen content of the blood in eclampsia and pre-eclampsia remains within normal limits, except in certain instances late in the disease when a rise indicates involvement of the kidneys as a result of eclamptic disease. The blood urea nitrogen was low as in normal pregnancy

The blood uric acid was increased in eclampsia and pre-eclampsia indicating a disturbance in its destruction in liver. The uric acid content in the blood may be regarded as an indicator of severity of disease.

Cadden and Farris (1936) studied non protein nitrogen, urea and rest nitrogen in normal pregnant women at different periods of gestation, during labour and post partum period. They found that non protein nitrogen of blood decreases during first six months of pregnancy and then increased steadily until one week post partum. The urea nitrogen concentration diminished significantly during the first six months and then maintained a constant level until the eihth or ninth month when it begins to rise. The ratio of urea nitrogen to non protein nitrogen is decreased significantly in pregnancy.

Cadden, J.F. and Stander, H.J. studied uric acid metabolism in eclampsia in 1939. They observed that increased blood uric acid in eclampsia can not be explained on the basis of decreased excretion by the kidneys because increase in blood uric acid appears as one of the early signs of the disease whereas kidney manifestations, such as nitrogenous retention as shown by the non protein nitrogen and urea values, appear late in the course of disease. High blood uric acid is probably

due to impaired hepatic destruction of this susbtance in the liver. This impairment in hepatic destruction of uric acid appears early in the disease may perhaps be important in etiology of eclampsia.

Chesley et al (1941) measured the body water available for thiocynate distribution i.e. extracellular water and concluded that patients who are found to have excessive available water, although apparently normal otherwise, are prone to develop the classical signs and symptoms of pre-eclampsia. Preeclampsia very seldom appears in those patients having normal proportions of available water in late pregnancy. According to them, measurement of available water is a more reliable index to the danger of developing toxaemia than does weight taking. Patients loose excess available water by the sixth post portum day.

Lancet, M. and Fisher, I.L. (1956) studied the value of blood uric acid levels in toxaemia of pregnancy and concluded that the level of blood uric acid can serve as good laboratory indicator in toxaemia of pregnancy. The test can serve as diagnostic as well as prognostic guide. In order to differentiate toxaemia from primary kidney disease and hypertensive disease, they suggested routine use of blood urea estimation as well. High uric acid and normal urea was a sign of toxaemia of pregnancy. Both were low in idiopathic

hypertensive disease. When both components were high it suggested primary kidney disease and usual renal function tests were employed.

Von Slyke stated in the same year that blood uric acid is as a rule high in toxaemia of pregnancy,more so in eclampsia and nephritis.

Easlier Prabhawati, R. (1957) reported elevated uric acid levels in toxaemia of pregnancy as compared to normal pregnancy. The concluded that it gives a fair indication of the severity of disease.

Danforin and Hull (1958) suggested that higher concentration of urea in amniotic fluid is due to its active transport from the maternal compartment into the amniotic fluid across the chorioamnion.

Russel, R. and Gloria, E. et al (1958) reported a series of renal clearances in normal pregnancy and found a significant decrease in clearances due to elevated glomerular filtration rate which began in first trimester of early in second trimester and persisted through the remainder of pregnancy. When normal pregnancy is compared with toxaemia of pregnancy and when mild degrees of toxaemia are compared with severe preeclampsia and eclampsia, a direct relationship existed between severity of toxaemia and the depression in glomerular filtration.

Mac Gaughey et al (1959) investigated the equilliberation of urea between the amniotic fluid, maternal and cord blood and concluded that diffusion of urea takes place through chorioamniotic surface and is not limited to maternal exchange through placenta.

Pollak, V.E. and Nettles, J.B. (1960) studied renal biopsies and observed the relations of histologic observations in relation to clinical and biochemical findings. Combination of hypertension, proteinuria and edema was found in sixty percent of patients with preeclampsia. In the patients with histologic evidence of preeclampsia, the values of serum urea nitrogen, non protein nitrogen and uric acid were elevated significantly above those in healthy pregnancy. The preeclamptic renal lesions were divided into three groups on the basis of the severity of the glomerular involvement. The levels of urea nitrogen non protein nitrogen and uric acid in the serum increased with increasing severity of glomerular involvement. In those patients with mild glomerular lesions, the serum uric acid was significantly elevated, whereas the urea nitrogen and non protein nitrogen levels were significantly elevated only in the presence of more severe renal lesions. Thus serum uric acid level is an excellent guide post to the diagnosis of preeclampsia and to the severity of the underlying renal lesion in preeclampsia.

Sorsenskii (1961) also reported higher urea content of the amniotic fluid in late toxaemia of pregnancy and stated that in toxaemia the urea content was highest in the urine of newborn obtained immediately after birth. He further stated that in toxaemia of pregnancy, the foetus is often in a state of asphyxia, so that the "Intrauterine reflex retention of urination" may be disturbed in the foetus. In these circumstances a large amount of urea may get into amniotic fluid, resulting in a rise of the urea content of amniotic fluid.

Hutchison et al (1962) investigated the distribution and metabolism of carbon labelled urea in pregnant primates and concluded that there was rapid exchange of urea between maternal and foetal bloods but the transfer to the amniotic fluid was slower.

Gupta, P., Kothari, L.K. and Gupta, S.N. (1963) estimated blood urea and uric acid levels in normal non pregnant and pregnant groups. In pregnancy complicated by toxaemia, urea was moderately high in 70 percent of cases while uric acid was conspicuously raised in all cases. The precise mechanism which leads to accumulation of uric acid in blood is still uncertain, although impaired renal excretion, diminished destruction by the liver and excessive formation associated with muscular exertion during convulsions have all been suggested as likely possibilities.

Reidel (1963) in a study showed that blood urea of mother rises with severity of toxaemia. He did not take into account the possible influence of gestation, age or parity on urea concentration.

Juvale and Gokhale (1964) studied the urea clearance test in normal pregnancy and toxaemia and they failed to detect any difference.

Mc Kay, E. and Kilpatrick, S.J. (1964) showed that the urea concentration in the umbilical venous plasma of non toxaemic pregnancies was raised when the birth weight was below average for the gestation period i.e. in infants showing IUGR. When the effect of gestation period was removed, a significant negative correlation was found between urea concentration and birth weight, the urea concentration being higher in low birth weight.

Increase in blood urea in dysmaturity was caused either by placental insufficiency which prevented the foetus from excreting its NPN (non protein nitrogen) through placenta or by increase in tissue destruction or by both mechanisms.

Later on, in 1965, Kilpatrick and Mc Kay studied umbilical cord urea concentration in toxaemic pregnancies and their relationships with birth weight and gestational age. They divided the cases into three groups namely 'Normotensives', 'Toxaemic' and 'Other hypertensives'. They found

that under weight infants of normotensives have a significantly higher mean urea than their fellows of normal weight. However, in toxaemic mothers, there appeared to be a reversal of the effect of birth weight on cord urea i.e. under weight had a lower mean urea concentration. Both hypertensive groups had higher urea concentration than normal pregnancies. These differences were independent of birth weight and gestation period. Toxaemic group had a significantly lower birth weight than normotensive group. Their studies suggested that the level of maternal blood pressure is more important in determining cord urea concentration than is gestation age or birth weight.

Kishore, N. and Tandon, S. (1965) studied blood urea, non protein nitrogen and serum uric acid and ophthalmoscopic findings in normal non pregnant females, healthy pregnant women and in pregnancy with toxaemia. Toxaemia cases were divided in four groups, mild and severe preeclampsia, eclampsia and pregnancy with essential hypertension. They concluded that the level of blood uric acid can serve as an important diagnostic criterion in toxaemias. Prognosis can be told and future line of treatment can be decided by the levels of blood uric acid. Blood non protein nitrogen was not changed significantly in cases of toxaemias of pregnancy.

Blood urea decreased in normal pregnancy, increased in toxaemia and came to normal on about 6th to 10th post partum day. Most common fundal change was found retinal spasm.

Chesley, L.C. (1966) studied sodium retention in preeclampsia and made serial estimations of exchangeable sodium and peurperial sodium loss and concluded that oedematous toxaemic women loose large amount of salt in the puerperium and that the salt loss is related to the degree of oedema and its regression. The rational explanation is that in the puerperium, there is a reversal of changes that occured in pregnancy, the salt loss has been retained during pregnancy.

Eastmann and Hilman (1967) also reported a significantly reduced urea clearance in toxaemia of pregnancy when compared to normal pregnancy.

Hytten Leitch (1971) showed the lower levels of serum urea and creatinine in normal pregnant woman compared with non pregnant subjects. It reflects the increased glomerular filtration rate in normal gestation and increased renal clearance. They also showed normal serum uric acid in normal pregnancy.

Saxena, C. and Kharoliwal, S. (1971) estimated urea concentration in the amniotic fluid and blood in normal pregnancy and toxaemia of pregnancy. They concluded that there was a rise in mean blood urea levels with the increase in severity of toxaemia and highest blood urea level was in eclampsia. There was definite increase in urea level of amniotic fluid with the increase in severity of toxaemia. Amniotic fluid urea was higher than the blood urea in both normal as well as toxaemic cases. The ratio of average maternal blood urea to average amniotic fluid urea was more. Therefore, though the increase in amniotic fluid urea is more in comparison to maternal blood urea.

Sinha, H.B. and Mukherjee, A.K. (1973) observed the urea content of amniotic fluid, maternal and foetal blood in normal pregnancy, preeclamptic toxaemia and eclampsia. Investigations were carried out between 38 and 41 weeks of gestation and cases were of the following types. They found that urea content of the amniotic fluid was found to rise with increasing severity of toxaemia and the highest mean value was observed in eclampsia. The rise in amniotic fluid urea content may be caused by diminished urea clearance by the foetus through the placenta, due to reduced circulation in choreodecidual space in toxaemia of pregnancy and increased excretion of urea through the foetal urine which under normal conditions would have been excerted through the placenta.

Parallel rise of maternal and cord blood urea was found in toxaemic cases compared with normal pregnancy. Rise in cord blood urea can be due to rise in amniotic fluid and maternal blood urea levels. Increased breakdown of proteins in foetal system may also contribute towards increase in cord blood urea because in their study the mean birth weight of the babies born to toxaemic mothers was significantly lower than the mean birth weight of normal babies. Positive correlation of the amniotic fluid urea level with that in maternal and cord blood in normal and toxaemic pregnancies suggests that free diffusion of urea takes place between the three fluids.

Rohtagi, P. and Tewari, K. et al (1973) evaluated a relationship of liquor urea with placental and foetal weight. They showed that there was rise in both blood urea and liquor urea in toxaemia cases, but liquor urea increased more as compared to blood urea. The mean birth weight of babies showed a significant fall in moderate, severe P.E.T. group and eclampsia group. Placental weight was lowered significantly in all groups of toxaemia.

Increase of liquor urea was negatively correlated to placental and foetal weight in all the groups of toxaemia which was highly significant in eclampsia. They concluded that rise of liquor urea is indicative of placental damage and due to placental damage there might be lowering of foetal weight as well.

Semple et al (1974) studied changes in uric acid concentration in a longitudinal study. This study suggested that serum uric acid concentration fell markedly in early pregnancy; thereafter there was a gradual rise through-out the pregnancy; but values after 30 weeks gestation were still significantly lower than those obtained after the puerperium. In addition renal clearance of uric acid rose through pregnancy, but this appeared to occur in parallel with increase in glomerular filtration rate, thus implying that no change occured in specific renal handling of uric acid. The changes in uric acid concentration reflected 'dilution' in early pregnancy followed by a gradual increase in the maternal uric acid due to foetal uric acid production.

Dunlop, W. and Davison, J.M. (1977) studied the effect of normal pregnancy upon the renal handling of uric acid and discussed with reference to that in preeclampsia. Plasma uric acid concentration appeared to be inversely related to uric acid clearance. When a comparison between non pregnant values and those obtained during pregnancy was done, the plasma uric acid concentration decreased and uric mic acid clearnace increased. An increase in fractional uric acid clearance was also demonstrated, indicating that the proportional reabsorption of uric acid was reduced.

Ojha, J. and Sarin, C.N. (1979) also studied the significante of maternal and cord blood urea in the toxaemia

of pregnancy and foetal outcome. They found higher urea levels in maternal and cord blood of toxaemic mothers and the rise was parallel with rise of blood pressure. Low birth weight and high cord blood urea levels were directly related to the severity of toxaemia.

Brazy and associates (1982) studied neonatal manifestations of severe maternal hypertension and they also reported that symmetrical intrauterine growth retardation and neonatal complications were frequent in infants of eclamptic mothers. Similarly Lopez Llera and associates and Weinstein et al (1982) also reported growth retardation and a syndrome of haemolysis, elevated liver enzymes and low platelet count as a consequence of severe hypertension in pregnancy.

Von Slyke stated that blood uric acid is as a rule high in toxaemia of pregnancy, more so in eclampsia or nephritis.

Saxena, S.K., Maewal, S., Khare, S. et al (1982) studied the comparison of amniotic fluid urea and blood urea in normal pregnancy and preeclamptic toxaemia. In normal pregnancy, in spite of the greatly increased demands for protein involved in the mother for foetus, the body is able to maintain the lower limits of normal blood urea. Amniotic fluid urea levels show a small rise over maternal serum urea levels in early weeks of pregnancy, but rises considerably in the later weeks of pregnancy, i.e. it was negatively correlated

in early pregnancy and in labour patient while positively in later weeks of pregnancy. There was definite rise in levels of blood urea and amniotic fluid urea with the increasing severity of toxaemia when compared with normal pregnancy. High urea concentration in amniotic fluid has definite correlation with the degree of toxaemia.

Despite the persistent efforts to decrease the incidence and improve the management of eclampsia, this obstetric complication continues to be a major causes of perinatal death world wide. Sibai, B.M. et al (1982) studied neonatal outcome, growth and development in eclampsia and found that infants of eclamptic mothers are at increased risk for prematurity, intrauterine growth retardation and perinatal asphyxia. Most of the immediate neonatal complications were related to prematurity and growth retardation.

Razdan, S., Sharma, M. and Mishra, K. et al (1984) studied the comparison of urea content in maternal blood, cord blood, and amniotic fluid in normal and toxaemic pregnancies and its significant in relation to foetal outcome. Cord blood urea level increased with increase in the degree of toxaemia and mean birth weight decreased with increase in mean cord blood urea level. Maternal blood, cord blood urea in severe P.E.T. group and eclampsia were significantly higher than mild and moderate P.E.T. group. Therefore estimation of maternal blood urea concentration may serve as a guide to severity of disease.

MATERIAL AND METHODS

MATERIAL AND METHOD

The present study was carried out to estimate the urea level, creatinine and uric acid level in maternal blood and cord blood of normal pregnant females and those suffering from toxaemia of pregnancy and results in both have been compared.

Selection of cases :

Estimation of the urea level, serum creatinine and serum uric acid was carried out in the following group of females :-

1. Healthy non-pregnant females.
2. Healthy pregnant females.
3. Pregnant females suffering from toxaemia of pregnancy.

For convenience toxaemia of pregnancy cases were divided into three groups depending upon the severity of the disease. Three parameters were considered i.e. blood pressure, oedema and proteinuria.

GROUP A : (Mild and moderate pre-eclampsia)

Those cases in which the blood pressure was detected upto 160/100 mm of Hg with detectable oedema and proteinuria.

GROUP B : (Severe pre-eclampsia)

In these cases blood pressure was raised above 160/100 mm of Hg with oedema and/or albuminuria.

GROUP C : (Eclampsia)

These patients presented with varying degree of hypertension, oedema, proteinuria with convulsions.

The healthy non-pregnant females were selected among those attending the out patients department in Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi between April 1990 to March 1991, and those admitted in ward for gynaecological problems. The normal pregnant females were selected among those admitted in Maternity Ward and Labour Rooms during the same period in some hospital, in last trimester of pregnancy, preferably within fifteen days preceeding the delivery. The cases of toxaemia of pregnancy were those admitted in the hospital in the third trimester of pregnancy near term.

In all these cases a detailed past and present obstetric history was taken. A thorough general examination, systemic and obstetric examination was done to note the period of gestation, presenting part, its position and engagement. Foetal heart was auscultated. Blood pressure was recorded in each patient.

Birth weight of the babies born to the above mothers was recorded in grams.

Investigations :

1. Haemoglobin estimation.
2. Albumin in urine by boiling test.
3. Estimation of urea level in maternal blood and cord blood.
4. Estimation of creatinine level in maternal blood and cord blood.
5. Estimation of uric acid level in maternal blood and cord blood.

Collection of sample :

1. Blood urea - Maternal blood was collected in an oxalate vial from the antecubital vein of the selected cases. The amount of blood taken was 2 ml.

   Cord blood was taken at the time of delivery from the baby's cord in an oxalate vial measuring 2 ml.

2. Serum creatinine - About 3 ml of maternal blood as well as cord blood were taken separately in plain vials.

3. Serum uric acid - Around 3 ml of maternal blood and cord blood was taken in two separate plain vials.

Estimation of urea level in maternal and cord blood was done by Nesslerisation method as described by King and Wootten, 1959.

Principle :

The sample of blood is digested by urease and the urea is thus converted into ammonia. After removal of the proteins, the colour produced by the ammonia with Nessler's reagent is compared with the colour produced under similar conditions with standard urea solution treated with urease. Direct Nesslerisation should not lead to production of cloudiness in the case of protein free filtrates from the unlaked blood.

The sulphydryl substances, glutathione and ergothionine which produce turbidity with Nessler's reagent because of insolubility of their mercury salt, are confined to the cells and do not appear in the filtrates with laked blood. Filtrates of unlaked blood have further advantage that no ammonia is contributed to the determination, through the action of arginase of the blood cells on the arginine contained in the commercial preparation of urease. The use of zinc hydroxide as deproteinizing reagent eliminates the small amount of turbidity producing substances contributed by most preparations of urease.

Method :

(a) Test - 0.1 ml of blood is added to a centrifuge tube containing 4.5 ml of isotonic sodium sulfate solution. 0.1 ml of urease solution is added and the tube is stoppered with a rubber lining, mixed and incubated at 37°C for 20 minutes.

0.2 ml of zinc sulfate and 0.2 ml of 0.5 N sodium hydroxide are added to precipitate the proteins. The mixture is well mixed by inversion and centrifuged. 3 ml of supernatant fluid (0.06 ml of blood) is treated with 2 ml of ammonia free distilled water, 0.05 ml i.e. a drop of iodine solution (toprevent clouding) and 1 ml of Nessler's reagent.

(b) Standard + 4.5 ml of isotonic solution in a similar tube and 0.1 ml of standard solution is added.

(c) Blank - 4.5 ml of isotonic solution, 1 ml of Nessler's reagent is added to each tube and readings are taken against blank using blue filter (480 nm).

Calculation :

$$\text{Blood urea (mg/100 ml)} = \frac{\text{Test reading - Blank reading}}{\text{Standard reading - Blank reading}} \times 100$$

Serum creatinine :

Principle - Creatinine is treated with picric acid in alkaline medium, gives a red colour which is measured colorimetrically. The reaction is called Jaffey's reaction. The method used is modified version of Brod et al.

Reagent :

1. Sodium tungstate, 10 percent
2. Sulphuric acid (2/3) N
3. Sodium hydroxide 0.10 percent
4. Saturated picric acid solution

5. Stock creatinine standard is prepared by dissolving 100 mg of pure dry creatinine in 100 ml of 0.1 N Hcl.

6. Working creatinine standard - Dilute 1 ml of stock solution to 100 ml with water.

7. Alkaline picrate solution is prepared just before use- 10 ml saturated picric acid and 2 ml NaOH,

Procedure :

Test - In a centrifuge tube 1 ml serum, 4 ml of water and 0.5 ml sodium tungstate and 0.5 ml sulphuric acid is mixed. The mixture is inverted and centrifuged. 3 ml of supernatent is taken in another tube.

Standard - 3 ml of working standard creatinine.

Blank - 3 ml of water is taken.

1.5 ml alkaline picrate solution is added to each tube and contents are mixed well and left for 10 minutes. Now the absorbance is measured using green filter (520 nm) against the blank.

Calculation :

$$\text{Serum creatinine (mg/100 ml)} = \frac{\text{Test reading}}{\text{Standard reading}} \times 6$$

Serum uric acid :

Principle - Uric acid is treated with phosphotungstic acid in alkaline medium. Phosphotungstic acid is reduced by uric acid forming a blue coloured complex which is measured colorimetrically.

Reagents :

1. Protein precipitant - 50 ml of sodium tungstate, 50 ml of 2/3 N sulphuric acid and a drop of phosphoric acid is mixed in 800 ml of water.
2. Phosphotungstic acid
3. Sodium carbonate 10 percent
4. Stock uric acid standard
5. Working uric acid standard is prepared by diluting 1 ml of stock standard to 200 ml with water.

Procedure :

Test - In a centrifuge tube 5.4 ml of protein precipitant solution is taken and 0.6 ml of serum is added to it. It is mixed well and centrifuged. 3 ml of supernatent is taken in another tube.

Standard - 3 ml of working standard is taken in a test tube.

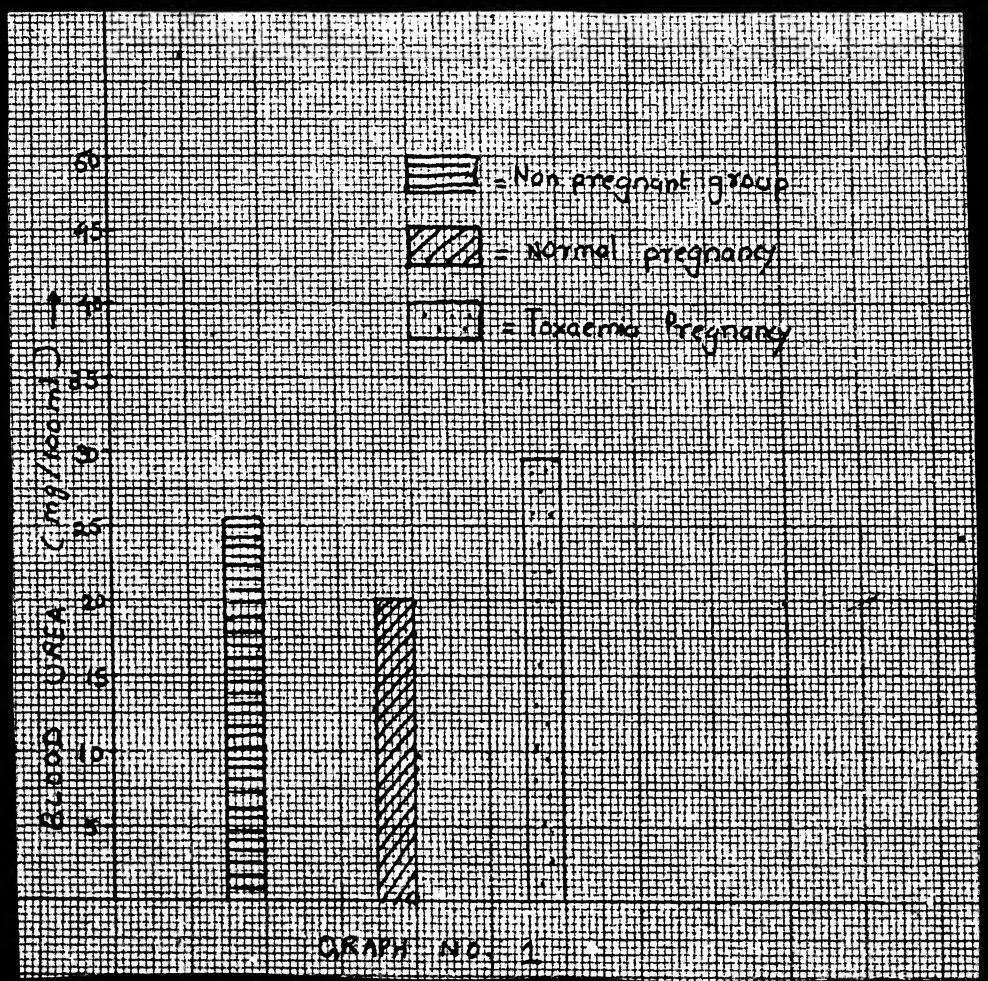
Blank - 3 ml of water.

0.6 ml sodium carbonate solution and 0.6 ml of phosphotungstic acid is added to each tube, mixed and placed in a water bath at 25°C for 30 minutes.

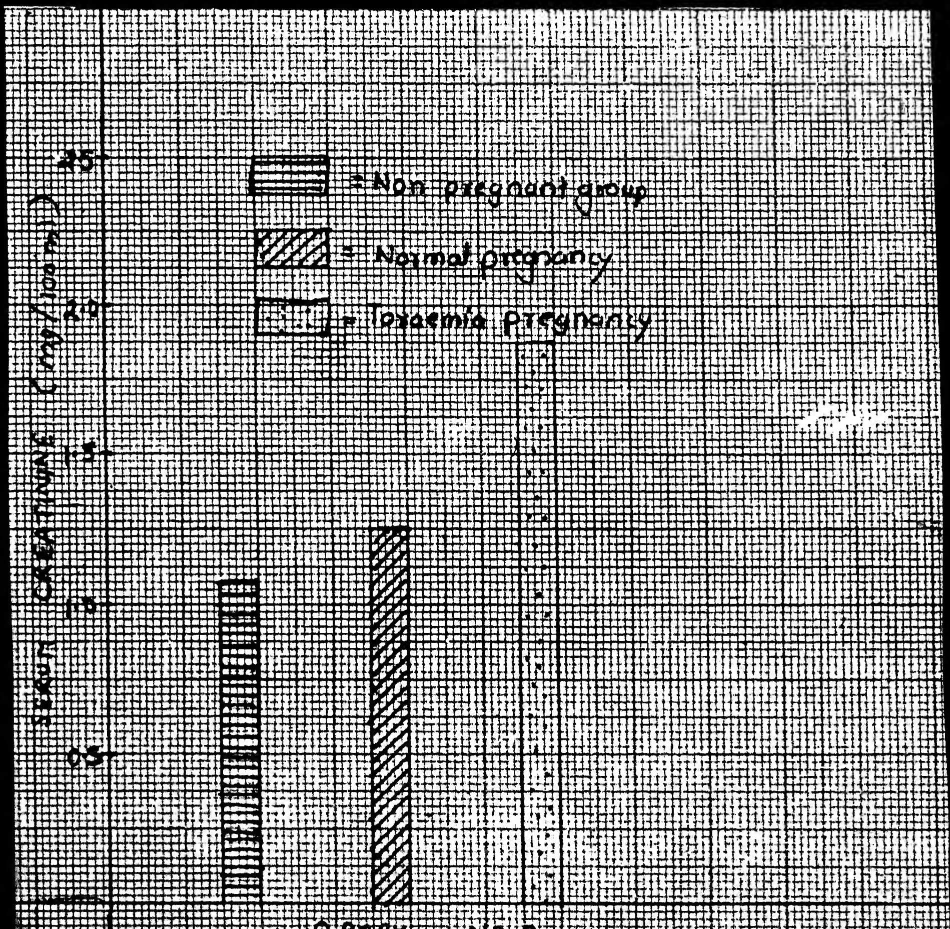
Now the absorbance is measured within 15 minutes using red filter (700 nm) against blank.

Calculation :

$$\text{Serum uric acid (mg/100 ml)} = \frac{\text{Test reading}}{\text{Standard reading}} \times 5$$

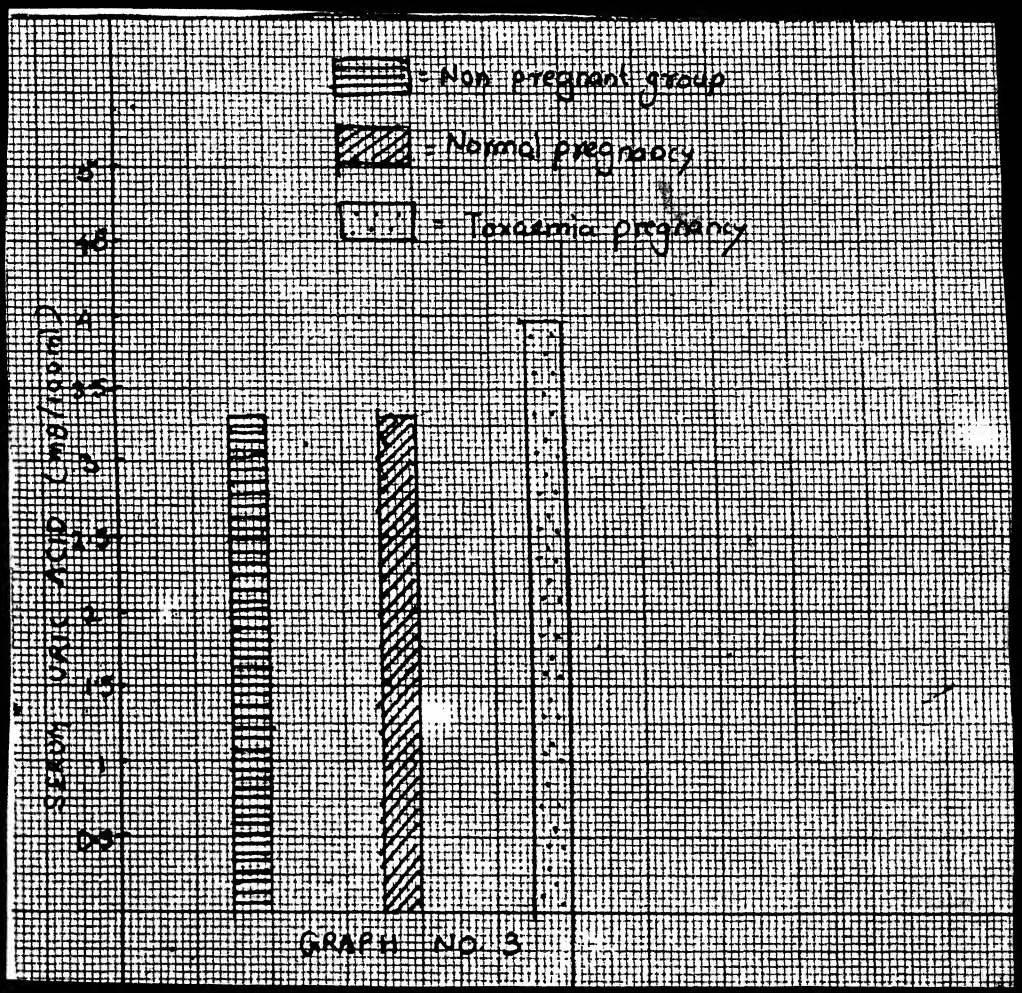

= Non pregnant group
= Normal pregnancy
= Toxaemia Pregnancy
BLOOD UREA (mg/100 cm)
50
45
40
35
30
25
20
15
10
5
0

GRAPH No. 1

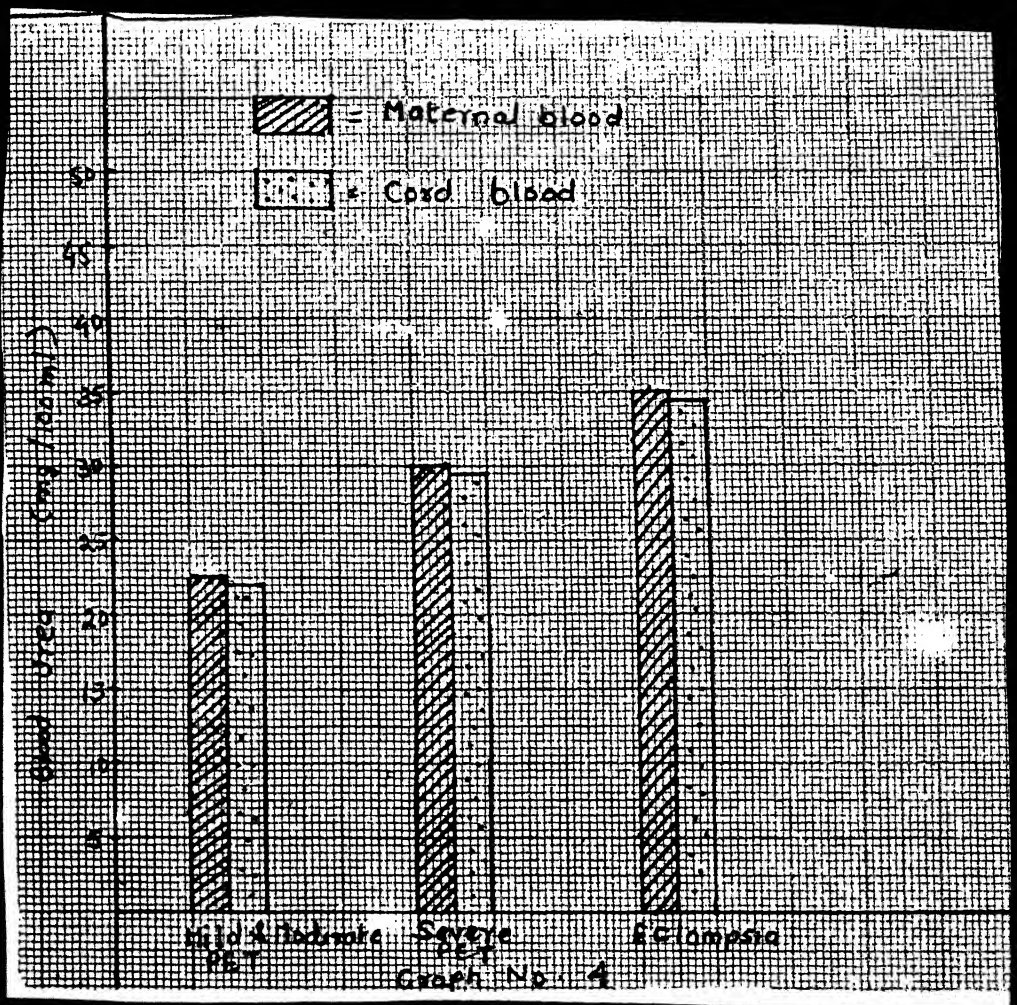


2.5
2.0
1.5
1.0
0.5
SERUM CREATININE (mg/100 ml)
= Non pregnant group
= Normal pregnancy
= Toxaemia pregnancy

GRAPH No-2


= Non pregnant group
= Normal pregnancy
= Toxaemia pregnancy
SERUM URIC ACID (mg/100ml)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5

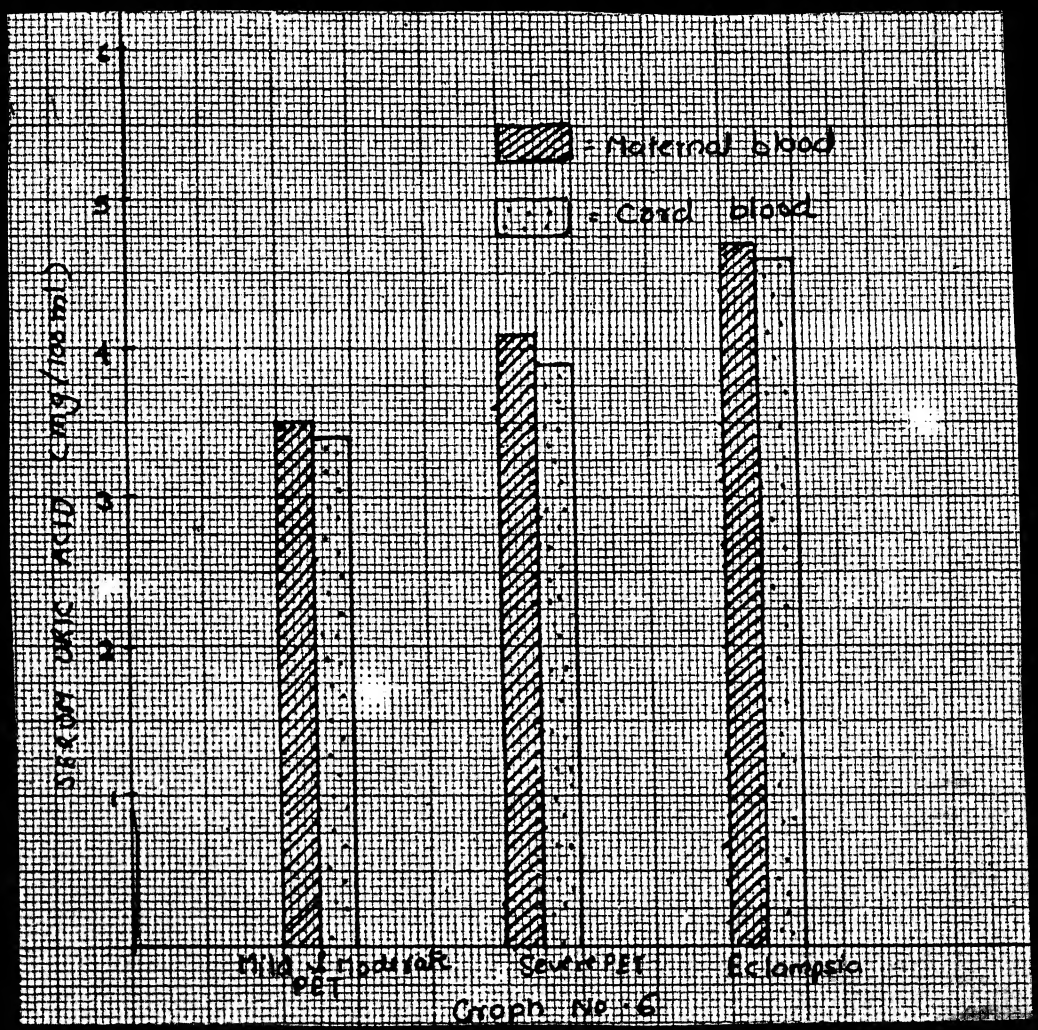
GRAPH NO. 3


= Maternal blood
= Cord blood
Drug level (mg %)
50
45
40
35
30
25
20
15
10
5
0
Mild & Moderate PE-T
Severe PE-T
Eclampsia

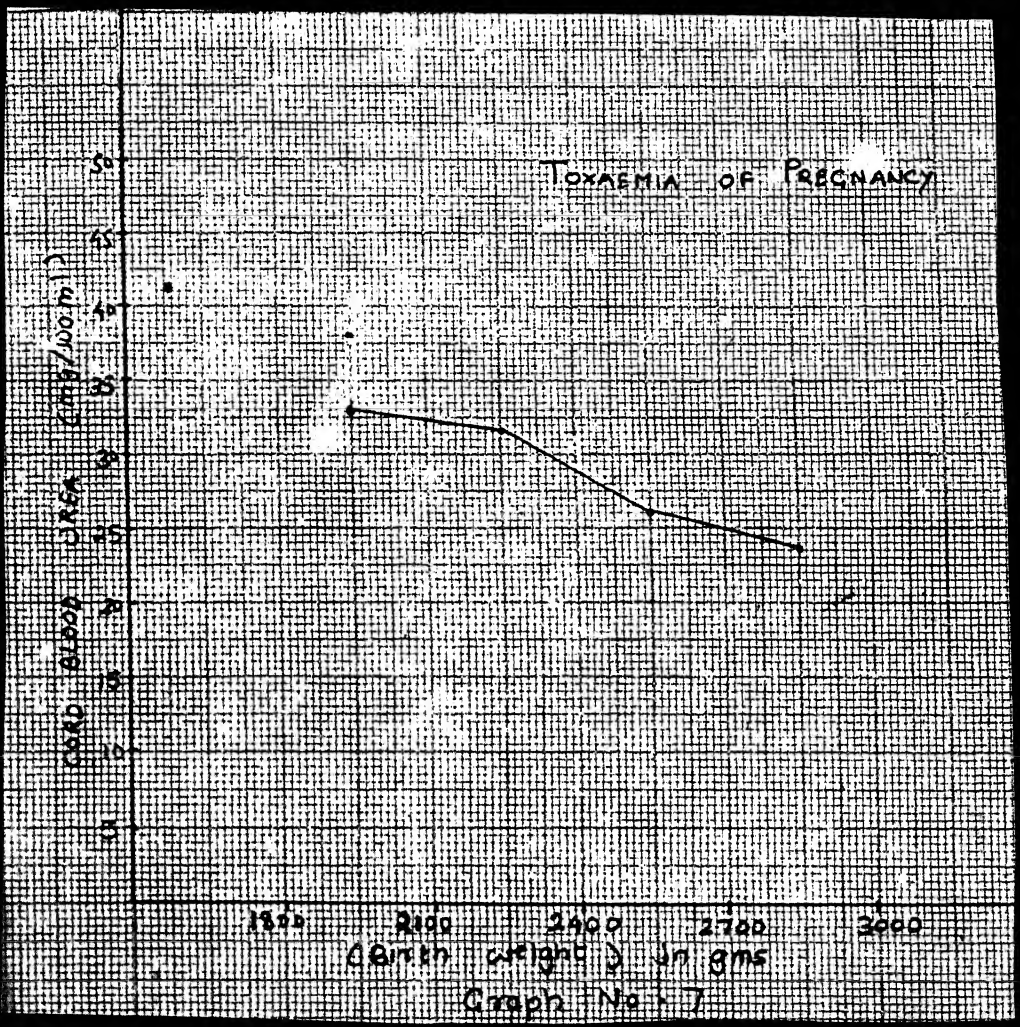
Graph No. 4

= Maternal blood
= Cord blood
SERUM CREATININE (mg%/dl)
3
2.5
2
1.5
1
0.5
Mild & Moderate PET
Severe PET
Eclampsia

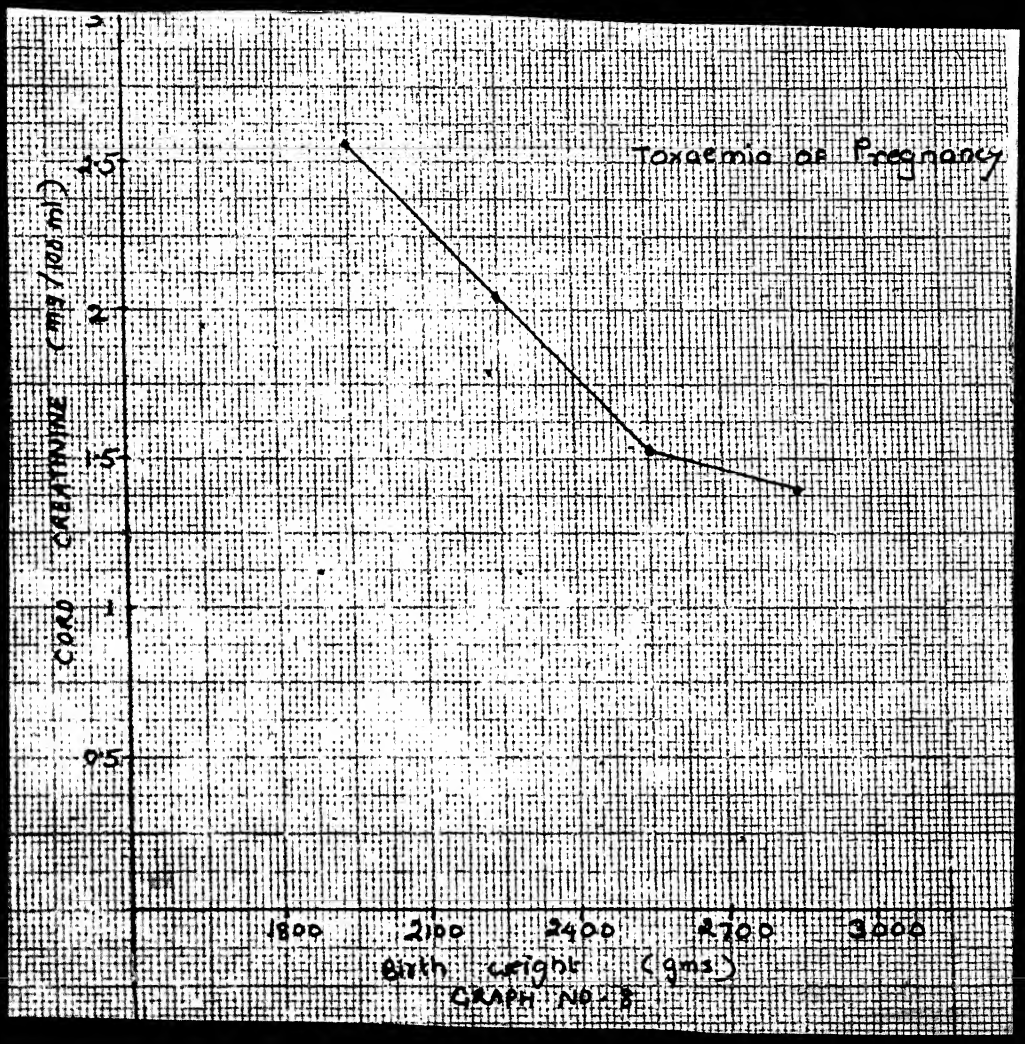
Graph No. 5

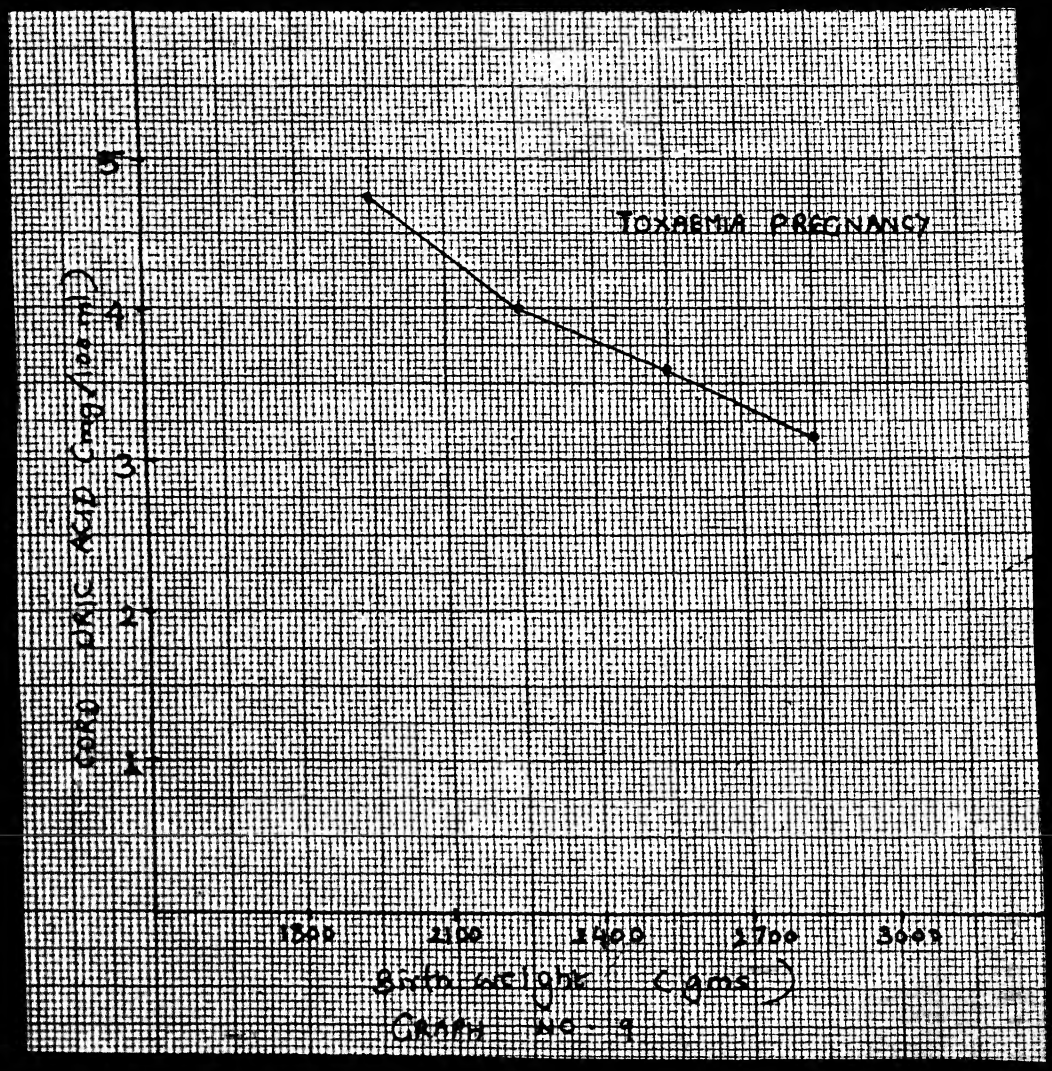

= Maternal blood
= Cord blood
Serum Uric Acid (mg/100 ml)
1
2
3
4
5
Mild PET
Moderate PET
Severe PET
Eclampsia

Graph No. 6


TOXAEMIA OF PREGNANCY
50
45
40
35
30
25
20
15
10
5
1800
2100
2400
2700
3000
Birth weight in gms

Graph No. 7


Toxaemia of Pregnancy
CORD CREATININE (mg%/100 ml)
2.5
2
1.5
1
.5
1800
2100
2400
2700
3000
Birth weight (gms)
GRAPH NO - 8


TOXAEMIA PREGNANCY
URIC ACID (mgms/100 c.c.)
5
4
3
2
1
1800
2100
2400
2700
3000
Birth weight (gms)

Graph no - 9

OBSERVATIONS

OBSERVATIONS

In my present study, I have estimated blood urea serum creatinine and serum uric acid in 25 non pregnant healthy females. These cases were selected among the females attending the out patient department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi.

Blood urea, serum creatinine and serum uric acid levels have been estimated in maternal blood and cord blood of 25 healthy pregnant females admitted in maternity ward and labour room in M.L.B. Medical College, Jhansi.

44 patients of toxaemia of pregnancy were selected from the admitted patients and maternal blood urea, serum uric acid and creatinine and in cord blood also, were estimated in each case. The birth weight of the babies born to above group of pregnant females were estimated.

The following are the details of observations :-

Blood urea, serum creatinine and serum uric acid in normal healthy non pregnant females :

Table No.1 shows the range of blood urea, serum creatinine and serum uric acid in non pregnant healthy females.

The blood urea in healthy non pregnant females ranged from 18-33 mg/100 ml with a mean value of 25.88 mg/100 ml ± 4.43 S.D. to find out the effect of age on blood urea levels in normal healthy non pregnant females, the cases were divided in various age groups. Table No.2 shows the blood urea levels in different age groups of normal healthy non pregnant females.

TABLE No. 2

Showing blood urea, in various age groups in normal healthy non pregnant females.

Age group (in years)	No.of cases	Percentage	Blood urea (mg/100 ml)		
			Range	Mean	S.D.
16-25	8	32	18-30	25.25	± 4.09
26-35	14	56	18-33	26.07	± 4.93
36-45	3	12	22-30	26.30	± 5.10

Statistical analysis of above data was done and p values calculated between age groups were more than 0.05 between any two groups i.e. Age has no effect on blood urea level.

The serum creatinine in healthy non pregnant females ranged from 0.6 mg/100 ml to 1.5 mg/100 ml with a mean value of 1.04 mg/100 ml ± 0.22 S.D.

To find out the effect of age on serum creatinine levels in normal healthy non pregnant females the cases were divided in various age groups. Table No.3 shows the serum creatinine levels in different age groups of normal healthy non pregnant females.

TABLE NO. 3

Showing serum creatinine in various age groups in normal healthy non pregnant females.

Age group (in years)	No.of cases	Percentage	Serum creatinine (mg/100 ml) Range	Mean	S.D.
16-25	8	32	0.6- 1.5	1.04 ±	0.26
26-35	14	56	0.8- 1.5	1.06 ±	0.23
36-45	3	12	0.8- 1.0	0.93 ±	0.15

Statistical analysis of above data was done and p values calculated between age groups were more than 0.05 between any two groups, i.e. no significant difference exists between two groups.

The serum uric acid in healthy non pregnant females ranged from 2.6 - 4.2 mg/100 ml with a mean value of 3.28 mg/100 ml ± 0.51 S.D.

To find out the effect of age on blood urea levels in normal healthy non pregnant females the cases were divided into various age groups. Table No.4 shows the serum uric acid levels in different age groups of normal healthy non pregnant females.

TABLE NO. 4

Showing serum uric acid in various age groups in normal healthy non pregnant females.

Age group (in years)	No.of cases	Percentage	Serum uric acid (mg/100 ml) Range	Mean	S.D.
16-25	8	32	2.8 - 4.2	3.20 ±	0.67
26-35	14	56	2.6 - 4.0	3.21 ±	0.52
36-45	3	12	3.0 - 4.2	3.73 ±	0.67

Statistical analysis of the above datas was done and p values calculated between various age groups is more than 0.05 i.e. the differences are not significant.

Urea levels, serum creatinine and serum uric acid during normal pregnancy .

Urea levels, serum creatinine and serum uric acid in maternal blood and cord blood and the birth weight of the babies born to these normal pregnant females has been shown in Table No.5.

The blood urea levels in maternal blood in normal pregnant females in present series ranged from 14 to 28 mg/100 ml with a mean value of 20.08 mg/100 ml ± 4.84 S.D.

The graph No.1 shows the blood urea levels in 25 non pregnant and 25 pregnant females.

The serum creatinine levels in maternal blood in normal pregnant females ranged from 0.6 mg - 2.0 mg/100 ml with a mean value of 1.26 mg/100 ml ± 0.44 S.D.

The Graph No.2 shows the serum creatinine levels in non pregnant and pregnant females.

The serum uric acid levels in maternal blood ranged from 2.6 - 4.2 mg/100 ml with a mean value of 3.29 mg/100 ml ± 0.46 S.D.

The Graph No.3 shows the serum uric acid levels in non pregnant and normal pregnant females.

In Table No.6, the cases studied in present series have been divided according to parity, and mean of blood urea, serum creatinine and serum uric acid has been represented in order to establish whether any relation existed between the parity and maternal blood urea creatinine and uric acid.

TABLE NO. 6

Showing blood urea, serum creatinine and serum uric acid in different parity groups.

Parity	No.of cases	Percentage	Maternal blood urea (mg%) Mean ± SD	Maternal serum creatinine (mg%) Mean ± SD	Maternal serum uric acid (mg%) Mean ± SD
1	10	40	19.6 ± 3.27	1.08 ±0.38	3.15±0.57
2	7	28	20.71± 4.43	1.20 ±0.42	3.20±0.46
⩾3	8	32	17.37± 2.48	1.53 ±0.45	3.52±0.46

On statistical analysis, p value was calculated between two groups and p value was found more than 0.05 between any two groups showing than no significant difference exists.

The cases were further classified on the basis of period of gestation and mean values of maternal blood urea, creatinine and uric acid in each group along with number of cases has been represented in Table No.7.

TABLE NO. 7

Showing the relation of period of gestation with maternal levels of urea, creatinine and uric acid in normal pregnancy.

Period of gestation (weeks)	No.of cases	Blood urea (mg/100 ml) Mean ± SD	Serum creatinine (mg/100 ml) Mean ± SD	Serum uric acid (mg/100 ml) Mean ± SD
34-35	7	19.28 ± 3.13	1.24 ± 0.44	3.20 ±0.45
36-37	12	19.92 ± 4.08	1.17 ± 0.65	3.31 ±0.53
38 +	6	17.67 ± 2.71	1.27 ± 0.52	3.33 ±0.58

On statistical analysis p value between any two groups was found to be more than 0.05 showing no significant difference.

Cord blood urea, creatinine and uric acid in normal pregnancy.

The blood urea levels in various blood of umbilical cord in 25 cases of normal delivery ranged between 14 - 26 mg/100 ml with a mean value of 18.28 mg% ± 6.04 S.D.

The serum creatinine in cord blood of normal deliveries ranged from 0.6 - 2.2 mg/100 ml with a mean value of 1.26 mg% ± 0.40 S.D.

The serum uric acid in cord blood of normal deliveries ranged from 2.6 - 4.0 mg/100 ml with a mean value of 3.34 mg% ± 0.41 S.D.

The obtained data was further classified on the basis of parity and period of gestation and their relationship has been observed in Table No.8 and 9.

The comparison of cord urea, creatinine and uric acid in normal pregnancy and toxaemia pregnancy has been depicted in Graph No. 1, 2 and 3 resprectively.

TABLE NO. 8

Showing relationship of cord blood urea, creatinine and uric acid with parity of mother in normal pregnancy.

Parity	No.of cases	Per-centage	Cord blood urea (mg/100 ml) Mean ± SD	Cord serum creatinine (mg/100 ml) Mean ± SD	Cord serum uric acid (mg/100 ml) Mean ± SD
1	10	40	19.00 ± 3.09	1.10 ± 0.30	3.28 ± 0.53
2	7	28	20.43 ± 3.80	1.21 ± 0.43	3.24 ± 0.46
3 +	8	32	17.62 ± 2.45	1.50 ± 0.70	3.49 ± 0.32

TABLE NO. 9

Showing relationship of gestational age and cord blood urea, creatinine and uric acid in normal pregnancy.

Gestational Age (in weeks)	No.of cases	Cord blood urea (mg/100 ml) Mean ± SD	Cord serum creatinine (mg/100 ml) Mean ± SD	Cord serum Uric acid (mg/100 ml) Mean ± SD
34-35	7	18.86 ± 3.28	1.29 ± 0.40	3.30 ± 0.37
36-37	12	19.75 ± 3.55	1.24 ± 0.40	3.29 ± 0.49
38 +	6	17.50 ± 2.07	1.27 ± 0.22	3.47 ± 0.23

On statistical analysis of above data, no significant difference was found to exist between any two groups. (p values always more than 0.05) i.e. parity and gestational age has no effect on cord blood values.

Birth weight of infants born to normal pregnant females

The birth weight of 25 infants born to the normal pregnant females ranged from 2000 gm - 3500 gm with a mean value of 2760 gm ± 380 S.D.

The birth weight of the babies were compared with period of gestation and umbilical cord urea, creatinine and uric acid and it represented in Table No. 10.

TABLE NO. 10

Showing relationship between period of gestation, mean birth weight, mean cord blood urea, mean cord creatinine and mean cord uric acid in cases of infants born to normal pregnant females.

Period of gestation	Birth weight (gms) Mean ± SD	Mean cord blood urea (mg/100 ml)	Mean cord creatinine (mg/100 ml)	Mean cord uric acid (mg/100 ml)
34-35	2330 ± 300	18.86	1.29	3.30
36-37	2840 ± 240	19.75	1.24	3.29
38 +	3120 ± 130	17.50	1.27	3.47

The mean birth weight was found to increase with increase in period of gestation.

The cord urea, creatinine and uric acid concentration was not found to related to birth weight or period of gestation (p value more than 0.05).

Urea, creatinine and uric acid levels in toxaemia of pregnancy.

Urea creatinine and uric acid levels in maternal and cord blood was estimated in 44 cases of toxaemia of pregnancy. For the purpose of detailed study these cases were divided into three groups.

Group 'A' - Mild to moderate preeclampsia 22 cases

Group 'B' - Severe preeclampsia 10 cases

Group 'C' - Eclampsia 12 cases

The urea, creatinine and uric acid levels in maternal and cord blood and the birth weight of the infants born to above groups has been represented in Table No. 11.

Table No. 12 shows age and parity wise distribution of cases of toxaemia of pregnancy.

TABLE NO. 12

Showing age group and parity distribution in toxaemia of pregnancy.

Age group (in years)	No.of cases	Percentage	Parity		
			Primipara	Second para	More than second para
16-25	25	56.8	16	6	3
26-35	19	43.2	4	8	7
Total	44		20	14	10
Percentage	-		45.5%	31.8%	22.7%

Toxaemia of pregnancy is more common primipara in age group 16-25 years.

Urea, Creatinine and Uric acid levels in toxaemia of Pregnancy.

Blood urea, serum creatinine and serum uric acid level was estimated in 44 cases of toxaemia of pregnancy which included 22 cases of mild to moderate preeclampsia and 10 cases of severe preeclampsia and 12 cases of eclampsia.

Table No. 13 shows their different levels in maternal blood in different degrees of toxaemia.

TABLE NO. 13

Showing blood Urea, Creatinine and Uric acid levels in different degrees of toxaemia.

Toxaemia of pregnancy	No.of cases	Mean blood urea (mg/100 ml) Mean ± SD	Mean serum creatinine (mg/100 ml) Mean ± SD	Mean serum uric acid (mg/100 ml) Mean ± SD
Mild to moderate PET	22	24.77 ± 4.24	1.55 ± 0.34	3.47 ± 0.71
Range		18 - 33	1.0 - 2.4	2.8 - 5.0
Severe PET	10	30.10 ± 2.51	1.85 ± 0.43	4.14 ± 0.86
Range		94 - 34	1.2 - 2.5	2.8 - 5.2
Eclampsia	12	35.17 ± 4.93	2.52 ± 0.96	4.70 ± 0.83
Range		28 - 42	1.2 - 2.5	3.1 - 6.0

The statistical analysis of the above data was done and shown in Table No. 17, 19 & 21. Graph No. 4, 5 & 6 shows the comparison of urea, creatinine and uric acid values in different degrees of toxaemia.

Cord blood urea, creatinine and uric acid levels in toxaemia of pregnancy .

Table No. 14 represents cord blood urea, creatinine and uric acid concentration in different degrees of toxaemia of pregnancy.

TABLE NO. 14

Showing urea, creatinine and uric acid levels in cord blood in different degrees of toxaemia of pregnancy

Toxaemia of pregnancy	No.of cases	Cord blood urea (mg/100 ml) Mean ± SD	Cord serum creatinine (mg/100 ml) Mean ± SD	Cord serum uric acid (mg/100 ml) Mean ± SD
Mild to moderate PET	22	24.18 ± 4.53	1.47 ± 0.34	3.37 ± 0.49
Range		18 - 33	0.9 - 2.0	2.8 - 4.2
Severe PET	10	29.20 ± 2.86	1.79 ± 0.40	3.93 ± 0.74
Range		24 - 34	1.0 - 2.5	3.2 - 5.2
Eclampsia	12	34.42 ± 4.62	2.55 ± 0.81	4.63 ± 0.77
Range		28 - 42	1.2 - 5.0	2.8 - 5.8

Statistical analysis of above data has been shown in Table No. 18, 20 and 22 and their comparison has been depicted in Graph No. 4, 5 and 6.

Birth weight, gestation period and cord blood urea, creatinine and uric acid in toxaemia of pregnancy

Birth weight recorded in 44 cases of toxaemia of pregnancy in present series. These included 31 babies who remained alive, 7 babies who died within 48 hours after birth and 6 babies who were still born.

For the purpose of correlating birth weight with cord blood urea, the birth weight was divided in four groups and mean cord blood urea, creatinine and uric acid in each group estimated. This is represented in Table No. 15 and Graph No. 7 and 8&9.

TABLE NO. 15

Showing the relation of birth weight to gestational age, cord urea, creatinine and uric acid levels in toxaemia.

Birth weight (gms)	No.of cases	Mean Gest. age (in wks)	Cord blood urea (mg/100 ml) Mean ± SD	Cord serum creatinine (mg/100 ml) Mean ± SD	Cord serum uric acid (mg/100 ml) Mean ± SD
1800-2100	10	36.2	33.30 ±3.77	2.54 ±0.42	4.75 ± 0.48
2101-2400	9	35.6	31.67 ±5.90	2.04 ±1.14	3.98 ± 0.91
2401-2700	14	36.8	25.70 ±3.75	1.52 ±0.34	3.61 ± 0.55
2701 +	11	36.7	23.55 ±5.30	1.43 ±0.38	3.17 ± 0.46
Total	44				

From the above observations it can be seen that the birth weight of infants born to the toxaemia mother are not related to period of gestation.

The birth weight has inverse relationship with cord blood urea. The cord blood urea increases with decrease in birth weight and the increase is statistically significant.

TABLE NO. 16

Showing birth weight in different grades of toxaemia

Severity of toxaemia	No.of cases	Birth weight (in gms) Range	Mean ± SD
Mild to moderate PET	22	2400 - 3200	2750 ± 220
Severe PET	10	1800 - 2800	2380 ± 326
Eclampsia	12	1800 - 2400	2058 ± 355

On statistical analysis of above data, following results were found :-

Between mild to moderate and severe PET	t = 3.80	p less than 0.01 significant
Between mild PET and eclampsia	t = 7.12	p less than 0.001 highly significant
Between severe PET and eclampsia	t = 2.20	p less than 0.05 significant

It shows from Table No. 16 and Graph No. 9 that birth weight of the new born decreases significantly as the severity of toxaemia increases.

TABLE No. 17

Showing comparison of maternal blood urea between normal pregnancy and different degrees of toxaemia.

Sl. No.	Groups of cases	No.of cases	Mean (mg%) ± SD	t value	p value
1.	Normal pregnancy	25	20.08 ± 4.48	3.51	Less than 0.01 significant
	Mild and moderate PET	22	24.77 ± 4.24		
2.	Normal pregnancy	25	20.08 ± 4.84	6.18	Less than 0.001 highly significant
	Severe PET	10	30.10 ± 2.51		
3.	Normal pregnancy	25	20.08 ± 4.84	8.88	Less than 0.001 highly significant
	Eclampsia	12	35.17 ± 4.93		
4.	Mild and moderate PET	22	24.77 ± 4.24	3.67	Less than 0.001 highly significant
	Severe PET	10	30.10 ± 2.51		
5.	Mild and moderate PET	22	24.77 ± 4.24	6.50	Less than 0.001 highly signficant
	Eclampsia	12	35.17 ± 4.93		
6.	Severe PET	10	30.10 ± 2.51	2.94	Less than 0.01 significant
	Eclampsia	12	35.17 ± 4.93		

TABLE NO. 18

Showing comparison of maternal serum creatinine between normal pregnancy and different degrees of toxaemia.

Sl. No.	Groups of cases	No.of cases	Mean (mg%)	± SD	t value	p value
1.	Normal pregnancy	25	1.26	± 0.44	2.48	Less than 0.05
	Mild and moderate PET	22	1.55	± 0.34		significant
2.	Normal pregnancy	25	1.26	± 0.44	3.68	Less than 0.001 highly
	Severe PET	10	1.85	± 0.43		significant
3.	Normal pregnancy	25	1.26	± 0.44	5.53	Less than 0.001 highly
	Eclampsia	12	2.52	± 0.96		significant
4.	Mild and moderate PET	22	1.55	± 0.34	2.14	Less than 0.05
	Severe PET	10	1.85	± 0.43		significant
5.	Severe PET	10	1.85	± 0.43	2.09	Less than 0.05
	Eclampsia	12	2.52	± 0.96		significant
6.	Mild and moderate PET	22	1.55	± 0.34	4.40	Less than 0.001 highly
	Eclampsia	12	2.52	± 0.06		significant

TABLE NO. 19

Showing comparison of serum uric acid between normal pregnancy and different degrees of toxaemia.

Sl. No.	Groups of cases	No.of cases	Mean ± SD (mg%)	t value	p value
1.	Normal pregnancy	25	3.29 ± 0.46	1.05	More than 0.05 not significant
	Mild and moderate PET	22	3.47 ± 0.71		
2.	Normal pregnancy	25	3.29 ± 0.46	3.86	Less than 0.001 highly significant
	Severe PET	10	4.14 ± 0.86		
3.	Normal pregnancy	25	3.29 ± 0.46	6.71	Less than 0.001 highly significant
	Eclampsia	12	4.70 ± 0.83		
4.	Mild and moderate PET	22	3.47 ± 0.71	2.40	Less than 0.05 significant
	Severe PET	10	4.14 ± 0.86		
5.	Severe PET	10	4.14 ± 0.86	1.50	More than 0.05 not significant
	Eclampsia	12	4.70 ± 0.83		
6.	Mild and moderate PET	22	3.47 ± 0.71	4.50	Less than 0.001 highly significant
	Eclampsia	12	4.70 ± 0.83		

TABLE NO. 20

Showing comparison of cord blood urea between normal pregnancy and different degrees of toxaemia.

Sl. No.	Groups of cases	No. of cases	Mean ± SD (mg%)	t value	p value
1.	Normal pregnancy	25	18.28 ± 6.04	3.76	Less than 0.001 highly significant
	Mild and moderate PET	22	24.18 ± 4.53		
2.	Normal pregnancy	25	18.28 ± 6.04	5.45	Less than 0.001 highly significant
	Severe PET	10	29.20 ± 2.86		
3.	Normal pregnancy	25	18.28 ± 6.04	8.16	Less than 0.001 highly significant
	Eclampsia	12	34.42 ± 4.62		
4.	Mild and moderate PET	22	24.18 ± 4.53	3.22	Less than 0.01 significant
	Severe PET	10	29.20 ± 2.86		
5.	Severe PET	10	29.20 ± 2.86	6.09	Less than 0.001 highly significant
	Eclampsia	12	34.42 ± 4.62		
6.	Mild and moderate PET	22	24.18 ± 4.53	6.26	Less than 0.001 highly significant
	Eclampsia	12	34.42 ± 4.62		

TABLE NO. 21

Showing comparison of cord blood creatinine in normal pregnancy and different degrees of toxaemia

Sl. No.	Groups of cases	No.of cases	Mean ± SD (mg%)	t value	p value
1.	Normal pregnancy	25	1.26 ± 0.40	1.96	Less than 0.05 just significant
	Mild and moderate PET	22	1.47 ± 0.34		
2.	Normal pregnancy	25	1.26 ± 0.40	6.88	Less than 0.001 highly significant
	Severe PET	10	1.79 ± 0.40		
3.	Normal pregnancy	25	1.26 ± 0.40	6.58	Less than 0.001 highly significant
	Eclampsia	12	2.55 ± 0.81		
4.	Mild and moderate PET	22	1.47 ± 0.34	2.34	Less than 0.05 significant
	Severe PET	10	1.79 ± 0.40		
5.	Severe PET	10	1.79 ± 0.40	2.68	Less than 0.05 significant
	Eclampsia	12	2.55 ± 0.81		
6.	Mild and moderate PET	22	1.47 ± 0.34	5.45	Less than 0.001 highly significant
	Eclampsia	12	2.55 ± 0.81		

TABLE NO. 22

Showing comparison of cord blood uric acid between normal pregnancy and different degrees of toxaemia.

Sl. No.	Groups of cases	No.of cases	Mean ± SD (mg%)	t value	p value
1.	Normal pregnancy	25	3.34 ± 0.41	0.23	More than 0.05 not significant
	Mild and moderate PET	22	3.37 ± 0.49		
2.	Normal pregnancy	25	3.34 ± 0.41	3.06	Less than 0.01 significant
	Severe PET	10	3.93 ± 0.74		
3.	Normal pregnancy	25	3.34 ± 0.41	6.70	Less than 0.001 highly significant
	Eclampsia	12	4.63 ± 0.77		
4.	Mild and moderate PET	22	3.37 ± 0.49	2.58	Less than 0.05 significant
	Severe PET	10	3.93 ± 0.74		
5.	Mild and moderate PET	22	3.37 ± 0.49	5.83	Less than 0.001 highly significant
	Eclampsia	12	4.63 ± 0.77		
6.	Severe PET	10	3.93 ± 0.74	2.17	Less than 0.05 significant
	Eclampsia	12	4.63 ± 0.77		

Maternal and foetal mortality in toxaemias :

In the present series of 44 cases of toxaemia of pregnancy, maternal death occured in two cases of eclampsia and 13 new born infants died which included 6 still borns.

TABLE NO. 23

Showing urea, creatinine and uric acid levels in maternal blood in two cases of maternal deaths.

Variable	Blood urea (mg/ 100ml)	Mean (mg/ 100ml)	Serum creatinine (mg/100ml)	Mean (mg/ 100ml)	Serum uric acid (mg/ 100ml)	Mean (mg/ 100ml)
1	40	41	5	3.25	6	5
2	42		1.5		4	

To establish the relationship between cord blood values and infant mortality the various values in cord blood have been tabulated in Table No. 24.

TABLE NO. 24

Showing the cord blood values relationship to infant mortality.

Variable	No.of cases	Cord blood urea Mean (mg%)	Cord serum creatinine Mean (mg%)	Cord serum uric acid Mean (mg%)
Babies died after birth	7	34.28	1.96	3.78
Still birth	6	34.83	3.07	5.10
Alive birth	31	25.42	1.57	3.60

Above observations show on statistical analysis that cord blood urea is raised significantly in still born babies and in babies who expired after birth as compared to alive babies. Cord creatinine and cord uric acid levels were also raised significantly in still born babies.

DISCUSSION

DISCUSSION

In our present study, a comparison was undertaken to assess the Urea, Creatinine and Uric acid content in maternal blood and umbilical cord blood in normal and toxaemia cases. Their levels have been correlated with the severity of disease and the foetal weight and outcome.

Blood Urea in normal healthy non pregnant females :

In order to find out the normal range and average value of blood urea in normal healthy non pregnant females, blood urea was estimated in 25 subjects. The blood urea in these subjects ranged from 18-33 mg/100 ml with a mean value of 25.88 mg/100 ml ± S.D. 4.43. To find out whether age has any effect on blood urea, the cases were divided into 10 yearly age groups. The blood urea in the age group 16-25 years ranged between 18-30 mg/100 ml with a mean value of 25.25 mg/100 ml ± S.D. 4.09, between 26-35 years ranges from 18-33 mg/100 ml with a mean value of 26.07 mg/100 ml ± S.D. 4.93, between 36-45 years ranged from 22-30 mg/100 ml with a mean value of 26.67 ± S.D. 5.10 mg/100 ml.

It will be seen from these figures that the (Table No. 2) difference between these figures between above mentioned groups does not exceed 2 mg/100 ml and on statistical

analysis, the difference in the mean values was insignificant (p values more than 0.05 between any two groups). Age was therefore not found to affect blood urea levels.

Our findings of blood urea in normal healthy individuals are in corroborations with the observations of King (1951), Cantarow and Trumper (1955), Miller (1955), Kishore and Tandon (1965) and Ramdan, S. (1984) who have reported the blood urea figures ranging from 20-32 mg/ 100 ml, 20-35 mg/100 ml, 19.26-36.38 mg/100 ml, 20-32 mg/ 100 ml and 18-30 mg/100 ml respectively. Our mean value of 25.88 mg/100 ml closely resembles the mean value of 25.08 mg% reported by Sharma et al (1976) and 23.52 mg/ 100 ml reported by Ramdan et al (1984).

Serum Creatinine in normal healthy non pregnant females:

25 normal non pregnant females were studied in order to find out normal range and average value of serum creatinine in normal healthy females. Serum creatinine in these subjects ranged from 0.6 - 1.5 mg/100 ml with a mean value of 1.04 mg/100 ml $\pm$ S.D. 0.22. To find out whether age has any effect on serum creatinine, the cases were divided into 10 yearly age groups. The serum creatinine in the age group 16-25 years ranged from 0.6 - 1.5 mg/100ml with a mean value of 1.04 mg/100 ml $\pm$ 0.26; between 26-35 years it ranged from 0.8 - 1.5 mg/100 ml with a mean value

of 1.06 mg/100 ml ± S.D. 0.23; between 36-45 years it ranged from 0.8 - 1 mg/100 ml with a mean value of 0.93 mg/100 ml ± S.D. 0.15. (Table No. 3)

It will be seen from these figures by statistical analysis, the difference in the mean values was insignificant (p values more than 0.05 in any groups). Age was therefore not found to affect serum creatinine levels.

Serum Uric acid in normal healthy non pregnant females :

In our study, serum uric acid was estimated in 25 cases of normal healthy non pregnant females to find out its normal range and average value. Serum uric acid in these subjects ranged from 2.6 - 4.2 mg/100 ml with a mean value of 3.28 mg/100 ml ± S.D. 0.51. To find out whether age has any effect on serum uric acid, the cases were divided in 10 yearly age groups. The serum uric acid in age group 16-25 years ranged from 2.8 - 4.2 mg/100 ml with a mean value of 3.2 mg/100 ml ± S.D. 0.67; in age group 26-35 years ranged from 2.6 - 4.0 mg/100 ml with a mean value of 3.21 mg/100 ml ± 0.52 S.D.; in age group 36-45 years ranged from 3.0 - 4.2 mg/100 ml with a mean value of 3.73 mg/100 ml ± S.D. 0.67. (Table No. 4)

It is seen from above figures on statistical analysis, the differences in mean values was insignificant (p values more than 0.05 in any two groups). Age was therefore not found to affect serum uric acid levels.

Our findings of serum uric acid coincides with the values of Kishore and Tandon (1965) who reported a range of 1.8 - 4.2 with a mean value of 3.02 mg/100 ml. Our findings also resemble closely that with the values of Stander and Caddan (1939) and King (1951).

Maternal blood urea during normal pregnancy :

The blood urea during normal pregnancy in 25 cases of our present series was found to range from 14 to 28 mg/100 ml with a mean value of 20.08 mg/100 ml ± S.D. 4.84. In order to find out whether parity and gestational age have any effect on maternal blood urea, the cases of normal pregnancy were divided in various groups on basis of age of gestation and parity and maternal blood urea is tabulated in each group in Table No. 6 and 7.

It is evident from these tables that in all of the sub-groups, the p value between any two groups, was always more than 0.05. No significant difference was thus found between the average blood urea figures of different sub-groups of parity and period of gestation.

The average value of maternal blood urea of 20.08 mg/100 ml during normal pregnancy was found to be significantly lower than the average value of 25.88 mg/100 ml in non pregnant healthy females of control group (p value less than 0.001). A number of factors have been held responsible for this fall in the values of blood urea during normal pregnancy. During pregnancy the blood volume increases resulting in a degree of haemodilution. At the same time the glomerular filtration rate increases and there is an increased urea clearance (Bucht, 1951). Furthermore, there is a remarkable nitrogen retention and diminished protein breakdown resulting in decreased formation of urea (Percival, 1969). (Graph No. 1)

A number of reports in literature on blood urea levels during normal pregnancy give support to our observations. Cadden and Farris (1936), Diechmann (1952), Cantarow and Trumper (1955), Purandre and Agashe (1959), Gupta et al (1963), Reidal (1963), Saxena and Kharoliwal (1971), Sinha and Mukerjee (1973), Ojha and Sarin (1979) have reported a mean blood urea value of 15.19 mg%, 25.68 mg%; 10.7 - 25.66 mg/100 ml; 16.1 mg/100 ml; 22 mg/100 ml; 16 mg/100 ml; 27.466 mg/100 ml; 13.80 mg/100ml and 17.7 mg/100 ml respectively. Our findings in this regard were lower than Diechmann et al (25.68 mg%), Gupta et al (22 mg%) and Saxena and Kharoliwal (27.46 mg%) and

a little more than Cadden and Farris (15.19 mg%); Reidel (16 mg%); Purandre and Agashe (16.1 mg%); Sinha and Mukerjee (13.8 mg%) and Ojha and Sarin (17.7 mg%).

Our findings resemble closely with those of Kishore and Tandon, 1965 (18.75 mg/100 ml); Sharma et al, 1976 (19.75 mg/100 ml), and Ramdan et al, 1984 (19 mg/100ml) during normal pregnancy.

Maternal serum creatinine during normal pregnancy :

In present series of 25 cases maternal serum creatinine ranged from 0.6 - 2.0 mg/100 ml with a mean value of 1.26 mg/100 ml $\pm$ S.D. 0.44. In order to find out the effect of parity and gestation on maternal serum creatinine, the cases were further calssified on the basis of parity and age of gestation and maternal serum creatinine is tabulated in different groups in Table No. 6 & 7.

It is evident from these tables, on statistical analysis, that in all of the subgroups, the p value between any two groups, was always more than 0.05. No significant difference was thus found between average serum creatinine values of different subgroups of parity and period of gestation.

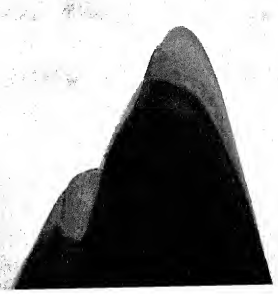
The average value of maternal serum creatinine of 1.26 mg/100 ml is slightly higher than the serum creatinine value of 1.04 mg/100 ml in non pregnant females (p value less than 0.05). (Graph No. 2)

Maternal serum uric acid during normal pregnancy :

In present series of 25 normal pregnant cases the serum uric acid ranged from 2.6 - 4.2 mg/100 ml with a mean value of 3.29 mg/100 ml ± S.D. 0.46. To know, whether the serum uric acid level was affected by parity and period of gestation, the cases were further divided in various subgroups according to parity and period of gestation. Serum uric acid in different subgroups has been tabulated in Table No. 6 & 7.

It is evident from these tables that on statistical analysis of all the subgroups, the p value between any two groups was always more than 0.05. Therefore, no significant difference was found between average serum uric acid values of different subgroups of parity and period gestation.

The average value of maternal serum uric acid of 3.29 resembles closely to serum uric acid levels of 3.28mg/100 ml of non pregnant females.(Graph No. 3)



Kishor and Tandon (1965) reported serum creatinine in normal pregnancy ranging from 3.8 - 4.6 mg/100 ml. with a mean value of 3.8 mg/100 ml. Purandre and Agashe (1959) found it between 2.6 - 3.6 mg/100 ml. Our findings resemble closely to that of Cadden anf Farris (1939) who also reported same values for both the groups. Victor and Pollak reported mean serum uric acid concentration in normal pregnancy of 3.57 mg/100 ml ± S.D. 0.69 which is slightly higher than the mean value in our present series.

Umbilical cord urea, creatinine and uric acid values in normal delivery cases :

In order to find out the normal levels of blood urea, creatinine and uric acid, estimation was done in 25 samples of blood withdrawn from umbilical vein at the time of delivery in normal pregnant cases. The umbilical cord urea in 25 cases of normal delivery ranged between 14 - 26 mg/100 ml with a mean value of 18.28 mg/100 ml ± S.D. 6.04. The maternal blood urea in these cases ranged between 14 - 28 mg/100 ml with a mean value of 20.08 mg/100 ml ± S.D.4.84. It is evident from above observations that the urea level in these cases of normal pregnancy resemble closely with each other and no significant statistical difference was observed between the two values (p value more than 0.05).

The serum creatinine in cord blood of normal delivery cases ranged from 0.6 - 2.2 mg/100 ml with a mean value of 1.26 mg/100 ml ± S.D. 0.40. Maternal serum creatinine in these cases ranged from 0.6 - 2.0 mg/100 ml with a mean value of 1.26 mg/100 ml ± S.D. 0.44 i.e. resemble to cord creatinine levels.

The serum uric acid levels in cord blood of 25 cases of normal delivery cases of normal pregnant females ranged from 2.6 - 4.0 mg/100 ml with a mean value of 3.34 mg/100 ml ± S.D. 0.41. Maternal serum uric acid levels in these cases renaged from 2.6 - 4.2 mg/100 ml with a mean value of 3.29 mg/100 ml ± S.D. 0.46. Both values resemble closely and there is no statistically significant difference exists between the values (p value more than 0.05).

Similar observations have been made by Sinha and Mukerjee (1973) who found mean maternal and core blood urea value of 13.80 mg% and 14.35 mg%, respectively; Sharma et al (1976) who reported mean maternal and cord blood urea of 19.75 mg% and 19.98 mg% respectively; Ojha and Sarin (1979) who reported the above values as 17.7 mg/100 ml and 17.6 mg/100 ml respectively and Ramdan et al (1984) who reported above values as 19 mg/100 ml and 19.84 mg/100 ml respectively. These observations therefore suggest that the urea, creatinine and uric acid is found in almost equal concentration in the blood of mother and foetus.

The data on umbilical cord blood urea was further analysed for different period of gestation and parity, details of which are represented in Table No. 8 and 9. It is obvious from the mean values in these tables that mean cord blood values in the sub-groups divided according to parity and period of gestation is not significantly different from the mean value of 18.28 mg/100 ml (p values more than 0.05 between any two groups). The period of gestation and parity therefore do not affect cord blood urea, creatinine and uric acid levels.

Birth weight of the babies born to normal pregnant females :

The birth weight of the infants born to the 25 normal pregnant females in our present series ranged from 2000 - 3500 gms with a mean values of 2760 gm ± S.D. 380. In order to assess the effect of gestation period, birth weight on umbilical cord blood urea, creatinine and uric acid, the new borns were divided according to period of gestation. The details of these readings have been represented in Table No. 10. It is evident from the above observations that mean birth weights were found to increase with the increase in period of gestation. No correlation was however found between birth weight, period of gestation and umbilical cord urea, creatinine and uric acid levels

which show an insignificant rise or fall in an irregular manner in the various gestation period groups. Sanford et al (1956) have stated that the birth weight of the mature new born infants lies between 2500 - 4300 gm and average lies between 3300 - 3400 gm. Our mean figure of 2760 gm lies within normal range but lower than mean value observed by Sanford et al (1956).

Our observations of mean cord blood urea levels of 18.28 mg/100 ml in normal weight babies born to normal healthy pregnant females resembles those of Kilpatrick and Mackay (1965) who have observed a mean cord blood urea of 18.7 mg/100 ml and S. Razdan et al (1984) who have observed a mean cord blood urea level of 19.84 mg% in normotensive pregnancies.

TOXAEMIA OF PREGNANCY

Age group and parity in toxaemia of pregnancy :

Out of 44 cases of toxaemia of pregnancy, 25 cases (56.8%) belonged to age group 16-25 years and 19 cases (43.2%) belonged to age group between 26-35 years (Table No. 12).

Regarding parity, maximum number of cases i.e. 20 cases (45.5%) were primipara, followed by 14 cases (31.8%) second para and 10 cases (22.7%) more than second para. Our observations regarding the parity wise and

incidence of toxaemia of pregnancy resembles to that of Pankamma et al (1957) who have also reported highest incidence of toxaemia in cases of primipara. In a large series of 2076 cases of toxaemia of pregnancy, these authors found that 1270 (61.17%) were primipara. since the disease is commonest in primipara the age group also tends to be lower in this condition. Our findings also coincide with those of Seth and Munsif (1966) in whose series primipara constituted 62.1% of cases and 39.8% of cases were below 22 years. Ojha and Sarin (1979) in their study reported that 56% of cases suffering from toxaemia of pregnancy were primipara and 44% were multipara. A relatively higher incidence was reported however regarding the incidence of disease in primipara by Eastman and Hilmann (1961) 77% and Sharma et al (1976) 70% and Prabhawati (1957) recorded incidence 77.16% in pre-eclampsia and 78.9% in eclampsia. Razdan et al (1984) reported 65% cases in age groups 16-25 years and 35% belonging to age group of 26-35 years resembles closely to our findings. They also recorded highest incidence 60% in primipara followed by 25% in second para and 15% in more than second para.

<u>Urea levels in toxaemia of pregnancy</u> :

The cases of toxaemia were divided into three groups according to the severity of toxaemia. Out of 44 cases

studied in present series, 22 belonged to mild and moderate pre-eclampsia, 10 belonged to severe pre-eclampsia and 12 cases belonged to eclampsia according to the criteria mentioned in material and methods. Blood urea level in overall group of toxaemia of pregnancy has a mean value of 28.82 mg/100 ml ± S.D. 6.02 mg%. This value is higher than 20.08 mg/100 ml of normal pregnancy and the difference is statistically highly significant (p value less than 0.001).

Urea levels in different degrees of toxaemias has been depicted in Table No. 13 & 14, and Graph No.4.

1. Mild to moderate pre-eclampsia : (Maternal & cord blood)

The maternal blood urea in 22 cases of mild and moderate pre-eclampsia ranged from 18-33 mg/100 ml. with a mean value of 24.77 mg/100 ml ± S.D. 4.24. Urea levels in cord blood in same cases ranged from 18-33 mg/100 ml with a mean value of 24.18 mg/100 ml ± S.D. 4.53.

The urea levels in maternal and cord blood in cases of normal pregnancy in our present series was 20.08 mg/100 ml and 18.28 mg/100 ml respectively. It is seen from these figures that these values are raised in mild and moderate pre-eclampsia as compared to normal pregnancy.

On statistical analysis, this rise in urea levels in maternal and cord blood in mild and moderate P.E.T. was found to be highly significant (p value less than 0.001).

Our maternal blood urea levels of 24.77 mg/100 ml resemble closely to those observed by Moshe Lancet and Fisher (1956), Kishor and Tandon (1965) and Ramdan et al (1984) whose mean values were 24.1 mg/100 ml, 24.6 mg/100 ml and 25.7 mg/100 ml respectively. Comparatively higher values have been reported by Dieckmann (1952) i.e. 28 mg/ 100 ml; Gupta et al (1963) i.e. 29.3 mg/100 ml; Saxena et al (1971) i.e. 30.28 mg/100 ml. Comparatively lower values of maternal blood urea have been reported by Crawford (1941) i.e. 21 mg/100 ml; Prabhawati (1957) i.e. 23 mg/100 ml ; Francis (1959) i.e. 22.2 mg/100 ml; Sinha et al (1973) i.e. 18.80 mg/100 ml and Sharma et al (1976) i.e. 22.67 mg/100 ml.

Our cord blood urea resembles closely to that of Ramdan et al (1984) i.e. 26.4 mg/100 ml but is slightly higher than those observed by Sinha and Mukerjee (1973) and Sharma et al (1976) whose values were 18.20 mg/100 ml and 22.28 mg/ 100 ml respectively.

2. <u>Severe Pre-eclampsia</u> : (Maternal and cord blood urea)

In our present series of 10 cases of severe pre-eclampsia, the maternal blood urea ranged from 26-34 mg/100 ml

with a value of 30.1 mg/100 ml ± S.D. 2.51. Cord blood urea in severe P.E.T. ranged from 24-24 mg/100 ml with a mean value of 29.2 mg/100 ml ± S.D. 2.86.

The rise in mean maternal and cord blood urea levels above the mean values observed in normal controls, the rise was found to be highly significant (p values less than 0.001).

It is evident from the Table No. 17 and 20 that rise of urea levels in severe pre-eclampsia over mild and moderate preeclampsia and normal pregnancies is highly significant (p values less than 0.001). (Graph No.4)

Our maternal blood urea values of 30.1 mg/100 ml in severe preeclampsia closely resembles those of Kishor and Tandon (1965); Saxena et al (1971); Sharma et al (1976) and Razdan et al (1984) whose values were 30.25 mg/100 ml; 30.78 mg/100 ml; 31.63 mg/100 ml; and 30.7 mg/100 ml respectively.

Our cord blood urea closely resembles to those observed by Sharma et al (1976) i.e. 31.19 mg/100 ml and Razdan et al (1984) i.e. 31.9 mg/100 ml.

3. Eclampsia : (Maternal and cord blood urea)

12 cases were available for study in the present series. The maternal blood urea in these cases ranged from

28-42 mg/100 ml with a mean value of 35.17 mg/100 ml ± S.D. 4.93. The cord blood urea in eclampsia cases ranged from 28-42 mg/100 ml with a mean value of 34.42 mg/100 ml ± S.D. 4.62. Thus the mean values of maternal and cord blood urea are found to be very much raised as compared to normal controls and normal pregnancy and the rise is statistically highly significant (p values less than 0.001).

The maternal blood urea was therefore found to be very useful in diagnosis of eclampsia. The rise in maternal and cord urea and their comparison is depicted in Tables No. 17 and 20, and Graph No.4.

Our findings in eclampsia are in confirmation with earlier observations of Stander and Cadden (1934), Lancet and Fisher (1956), Prabhawati (1957), Sinha et al (1973), Sharma et al (1976) who have reported mean maternal blood urea figures of 33.38 mg/100 ml, 36.3 mg/100 ml, 34.1 mg/100 ml, 43.4 mg/100 ml, 33.472 mg/100 ml, 27.4 mg/100 ml, 49.08 mg/100 ml respectively in their cases of eclampsia. Our values of maternal blood urea levels (35.17 mg/100 ml ± S.D. 4.93) in eclampsia resemble closely to value 36.3 mg/100 ml reported by Lancet and Fisher (1956), 34.1 mg/100 ml by Prabhawati (1957) and Razdan et al (36.5 mg/100 ml).

We differ with the observations of Francis (1939) who has reported mean maternal blood urea leve of 21.52 mg/100 ml in eclampsia and 31.2 mg/100 ml i preeclampsia.

Cord blood urea levels are maximum in case eclampsia as compared to preeclampsia and normal cont as reported by Sinha and Mukerjee (1973), Sharma e (1976) and Ojha and Sarin (1979). The rise in mate blood urea is highly significant statistically in ecl cases.

In our series of 44 cases, the urea level registered a rise with increasing severity of toxaemia in maternal blood and cord blood. The rise in materna blood urea of toxaemia of pregnancy is due to abnormal in renal functions. According to Dewardner (1969), the is a fall in glomerular filtration rate. Urea clearan from blood and its excretion in urine is directly rela to glomerular filtration rate. In toxaemia of pregnanc the clearance of urea will therefore be decreased, res ing in rise in blood urea levels. Estimation of matern blood urea concentration may therefore serve as a guid to fall in glomerular filtration rate and consequently the severity of the disease. Bucht (1951), Lancet and Fisher (1956), Riedel (1963), Kilpatrick and Mackay (1

Kishor and Tandon (1965), Saxena et al (1971), Sinha et al (1973), Sharma et al (1976), Ojha and Sarin (1979) and Razdan et al (1984) have also reported increasing level of maternal blood urea with increasing severity of toxaemia.

Creatinine levels in toxaemia of pregnancy :

The cases of toxaemia of pregnancy were divided into three groups according to the severity of toxaemia. Out of 44 cases studied in present series. Serum creatinine level in overall group of toxaemia of pregnancy ranged from 1.0 - 5.0 ml with a mean value of 1.88 mg/100 ml ± S.D. 0.7. This value is higher than 1.26 mg/100 ml of normal pregnancy and 1.04 mg/100 ml of non pregnant groups. Creatinine levels in different degree of toxaemia has been depicted in Table No. 13 and 14, and Graph No. 5.

1. Mild to moderate preeclampsia :(Maternal and cord blood)

The maternal serum creatinine in 22 cases of mild and moderate preeclampsia ranged from 1.0 - 2.4 mg/100 ml with a mean value of 1.55 mg/100 ml ± S.D. 0.34. Creatinine levels in cord blood in same cases ranged from 0.9 - 2.0 mg/100 ml with a mean value of 1.47 mg/100 ml ± S.D. 0.34. It is seen from above figures that these values are raised in mild and moderate preeclampsia as compared to normal pregnancy. On statistical analysis, the rise in creatinine levels in maternal and cord blood in mild and moderate PET was found to be highly significant (p value less than 0.001)

2. Severe preeclampsia : (Maternal and cord blood)

In our present series of 10 cases of severe preeclampsia, the maternal serum creatinine ranged from 1.2 - 2.5 mg/100 ml with a mean value of 1.85 mg/100 ml ± S.D. 0.43. Cord blood creatinine in severe P.E.T. ranged from 1- 2.5 mg/100 ml with a mean value of 1.79 mg/100 ml ± S.D. 0.4.

The rise is serum creatinine in maternal and cord blood above the normal controls is depicted in Table No. 18 and 21 and the rise was found to be highly significant (p values less than 0.001).

3. Eclampsia : (Maternal and cord serum creatinine)

In 12 cases available for study in present series the maternal serum creatinine ranged from 1.2 - 5 mg/100 ml with a mean value of 2.52 mg/100 ml ± S.D. 0.96. The creatinine level in cord blood in these cases ranged from 1.2 - 5 mg/ 100 ml with a mean value of 2.55 mg/100 ml ± S.D. 0.81. Thus the mean values of maternal and cord creatinine are found to be very much raised as compared to normal controls and normal pregnancy and the rise is statistically highly significant (p values less than 0.001). The rise in maternal and cord creatinine in eclampsia and their comparison is depicted in Tables No. 18 and 21, and Graph No. 5.

In our series of 44 cases, the creatinine levels showed a rise with increasing severity of toxaemia in maternal and cord blood. The rise is more significant in cases of eclampsia and severe PET than mild and moderate PET. This rise might be due to abnormality in renal functions which occurs in toxaemia of pregnancy.

Uric acid levels in toxaemia of pregnancy :

The cases of toxaemia of pregnancy were divided into three groups according to severity of toxaemia. Out of 44 cases in present series serum uric acid level in over all group of toxaemia of pregnancy ranged from 2.8 - 6.0 mg/100 ml with a mean value of 3.96 mg/100 ml ± S.D. 0.88. This value is higher than 3.29 mg/100 ml of normal pregnancy and the rise is highly significant (p value less than 0.001). Uric acid levels in different degrees of toxaemias has been depicted in Table No. 13 and 14, and Graph No. 6.

1. Mild to Moderate Pre-eclampsia : (Maternal and cord blood)

The maternal serum uric acid in 22 cases of mild and moderate pre-eclampsia ranged from 2.8 - 5 mg/100 ml with a mean value of 3.47 mg/100 ml ± S.D. 0.71. Serum uric acid levels in cord blood in same cases ranged from 2.8 - 4.2 mg/100 ml with a mean value of 3.37 mg/100 ml ± S.D. 0.49. The uric acid levels in maternal and cord blood in cases of normal pregnancy in our present series was 3.29 mg/100 ml and

3.34 mg/100 ml respectively. On statistical analysis, this rise in maternal and cord blood uric acid in mild and moderate preeclampsia was not significant (p value more than 0.05).

2. Severe Pre-eclampsia : (Maternal and cord blood)

In present series of 10 cases of severe pre-eclampsia the maternal serum uric acid ranged from 2.8 - 5.2 mg/100 ml with a mean value of 4.14 mg/100 ml ± S.D. 0.86. Cord serum uric acid ranged from 3.2 - 5.2 mg/100 ml with a mean value of 3.93 mg/100 ml ± S.D. 0.74. This value if higher than the mean value of 3.29 mg/100 ml in normal pregnancy, the rise being highly significant (p values less than 0.001).

3. Eclampsia :

Maternal and cord blood of 12 cases were available for study in present series. The maternal serum uric acid levels in eclampsia ranged from 3.1 - 6 mg/100 ml with a mean value of 4.7 mg/100 ml ± S.D. 0.83. The serum uric acid in cord blood of eclampsia cases ranged from 2.8 - 5.8 mg/100 ml with a mean value of 4.63 mg/100 ml ± S.D. 0.77. Thus the mean value of maternal and cord blood uric acid are raised as compared to normal controls and normal pregnancy and the rise is highly significant (p values less than 0.001).

The changes in uric acid concentration in different degrees of toxaemia in maternal and cord blood has been tabulated in Table No. 19 and 22, and Graph No.6.

Several workers have reported a series of values of uric acid concentration in maternal blood in normal pregnancy and toxaemia of pregnancy. Lancet and Fisher (1956) showed mean uric acid levels in mild and moderate preeclampsia, severe preeclampsia and eclampsia as 5 mg/ 100 ml, 6.24 mg/ 100 ml and 7.46 mg/100 ml respectively. They concluded that levels of uric acid can serve as good laboratory indicator in toxaemia of pregnancy. Victor and Pollak (1959) reported higher values of uric acid i.e. 6.43 mg/100 ml in toxaemia of pregnancy. Stander and Cadden (1934) also concluded that degree of hyper uricemia correlates well with severity of disease. They reported a mean value of 4.6 mg/100 ml in pre-eclampsia and 6.2 mg/100 ml in eclampsia. Kishor and Tandon (1965) reported mean value of 5.2 mg/100 ml in mild preeclampsia, 5.63 mg/100 ml in severe pre-eclampsia and 7.2 mg/100 ml in eclampsia. Gupta et al (1963) reported mean value of serum uric acid as 5.5 mg/100 ml in mild P.E.T., 6.2 mg/ 100 ml in severe pre-eclampsia and 6.7 mg/100 ml in eclampsia. Prabhawah (1957) reported mean value of serum uric acid as 4.4 mg/100 ml and 5.5 mg/100 ml in mild, severe pre-eclampsia and eclampsia respectively.

Hyperuricaemia in toxaemias of pregnancy can be due to accumulation of uric acid in blood due to impaired renal excretion, diminished destruction by the liver and excessive formation associated with muscular exertion during convulsions. All have been suggested as likely possibilities.

Maternal and infant mortality :

In our present series of 44 cases of toxaemia of pregnancy death occured in 2 cases of toxaemic mothers(4.5%) and in 13 new born infants (29.5%). The toxaemic mothers who expired were cases of eclampsia and had mean maternal urea of 41 mg%, mean serum creatinine of 3.25 mg% and mean serum uric acid of 5 mg/100 ml. Maternal death rate in eclampsia was 16.6%. High maternal blood urea, serum creatinine and serum uric acid were more and might be responsible for death of mother.(Table No.23)

The percentage of infant mortality in mild pre-eclampsia was 4.5%, in severe pre-eclampsia was 30% and in eclampsia was 75%. In 31 new born infants who remained alive the mean cord blood urea was 25.42 mg/100 ml and 7 new borns who expired within 24 hours after birth, the mean cord urea was 34.28 mg/100 ml and in 6 still borns, it was 34.28%. High cord blood urea levels therefore indicate danger to the life of new born infants and would be helpful in judging the prognosis of new born infant in terms of mortality. A highly

significant correlation therefore existed between cord blood urea levels and mortality of infant similar correlation existed between cord blood creatinine and uric acid which was 3.07 mg/100 ml and 5.1 mg/100 ml respectively in still born. (Table No. 24)

Razdan et al (1984) reported maternal mortality rate of 5%. Prabhavati et al (1957) reported 6.67%. We agree with Menon (1969) and Razdan (1984) that maternal deaths in toxaemia was due mainly to eclampsia as none of the maternal death occured in pre-eclampsia cases of our series.

Relation of cord blood values with birth weight of infants and period of gestation in toxaemia of pregnancy :

It is evident from the Table No.15 that birth weight of the infants born to toxaemic mothers falls with the increase in cord urea, creatinine and uric acid levels. Our findings of inverse relationship of birth weight and cord blood urea levels are in confirmation with those of Sjostedt (1956); Kilpatrick and Mackay (1965); Sinha and Mukerjee (1973); Sharma et al (1976); Ojha and Sarin (1979) and Razdan (1984) who have correlated high cord blood urea with low birth weight in toxaemia of pregnancy. (Graph No. 7, 8, 9)

Our observations have already revealed that the maternal and cord blood urea, creatinine and uric acid concentrations rises with increasing severity of toxaemia. The mean birth weight was found to decrease and the mean cord urea, creatinine and uric acid found to increase with increasing severity of toxaemia of pregnancy. Pankamma (1957) have also observed that the diminished foetal weight was more with increasing severity of toxaemia. Our observations also resemble with the findings of Sjosted et al (1958) who after estimating non protein nitrogen concentration in umbilical cord blood of 804 infants, showed that the concentration rose with increasing signs of dysmaturity and have postulated that raised plasma non protein nitrogen concentration in dysmaturity was caused by placental insufficiency which prevented the foetus from excreting non protein nitrogen from placenta. On statistical analysis a significant difference was observed between birth weight in mild and moderate pre-eclampsia and severe PET (p value less than 0.01) and highly significant difference was observed between mild and moderate PET and eclampsia (p value less than 0.001). Less significant difference was observed between severe PET and eclampsia (p value less than 0.05). The values are represented in Tab Graph No. 10 and

in Table No. 16. There is no direct correlation exists between cord blood values and gestation period in toxaemia of pregnancy as well as in normal pregnancy. This finding of ours is in agreement with the observations of Kilpatrick and Mackay (1965) and Razdan (1984) who have not found any significant correlation between period of gestation and cord blood urea.

C O N C L U S I O N

CONCLUSIONS

Our present study has lead to following conclusions :-

1. The blood urea in normal healthy non-pregnant females ranged from 18-33 mg/100 ml with a mean value of 25.88 mg/100 ml ± S.D. 4.43.
2. There is no statistically significant difference in mean blood urea concentration in different age groups.
3. The serum creatinine in healthy non-pregnant females varies from 0.6 - 1.5 mg/100 ml with a mean value of 1.04 mg/100 ml ± S.D. 0.22.
4. Age has no effect on serum creatinine values in non pregnant females.
5. Serum uric acid in non-pregnant females ranged from 2.6 - 4.2 mg/100 ml with a mean value of 3.28 mg/100 ml ± S.D. 0.51.
6. There was no effect of age on serum uric acid values in non pregnant females.
7. The blood urea in normal pregnancy ranged from 14-28 mg/100 ml with a mean value of 20.08 mg/100 ml ± S.D. 4.48. This value is less than non pregnant group and the difference is highly significant.

8. The cord urea level is almost equal to blood urea in normal pregnancy. It ranged from 14 - 26 mg/100 ml with a mean value of 18.28 mg/100 ml ± S.D. 6.04.

9. Serum creatinine levels in normal pregnancy ranged ranges from 0.6 - 2 mg/100 ml with a mean value of 1.26 mg/100 ml ± S.D. 0.44. This value is higher than non pregnant group but the difference is not much significant.

10. Serum uric acid level in normal pregnancy ranged from 2.6 - 4.2 mg/100 ml with a mean value of 3.29 mg/100 ml ± S.D. 0.46. This value is almost equal to non pregnant group and there is no significant difference between the values.

11. In normal pregnancy period of gestation and parity has no effect on mean urea levels, mean creatinine levels and mean uric acid levels.

12. Mean cord creatinine levels in normal pregnancy ranged from 0.6 - 2.2 mg/100 ml with a mean value of 1.26 mg/100 ml ± S.D. 0.4 which is similar to maternal creatinine levels in normal pregnancy.

13. Serum uric acid in cord blood of normal deliveries ranged from 2.6 - 4 mg/100 ml with a mean value of 3.34 mg/100 ml ± S.D. 0.41. This value is not significantly different from mean maternal serum uric acid.

14. Parity and age of gestation has no relation with cord blood values in normal pregnancy.

15. Birth weights of the babies born to normal pregnant mothers ranged from 2000 - 3500 gms with a mean value of 2760 gm ± S.D. 380. The mean birth weight was found to increase with the increase in period of gestation.

16. Cord blood values does not vary with birth weight in normal pregnancy.

17. Toxaemia of pregnancy is more common in primipara, in 16 - 25 years age group.

18. Mean blood urea in mild and moderate pre-eclampsia ranged from 18 - 33 mg/100 ml with a mean value of 24.77 mg/100 ml ± S.D. 4.24, in severe preeclampsia, from 26-34 mg/100 ml with a mean value of 30.1 mg/100 ml ± S.D. 2.52, in eclampsia it ranged from 28-42 mg/100 ml with a mean value of 35.17 mg/100 ml ± S.D. 4.93.

19. There is highly significant rise in mean maternal blood urea in severe P.E.T. and eclmapsia, over normal pregnancy and the rise is less significant in mild and moderate P.E.T. The mean blood urea increases with increase in severity of toxaemia.

20. Mean serum creatinine in mild and moderate P.E.T. ranged from 1 - 2.4 mg/100 ml with a mean value of 1.55 mg/100 ml ± S.D. 0.34, in severe P.E.T. it ranged from 1.2 - 2.5 mg/100 ml with a mean value of 1.85 mg/ 100 ml ± S.D. 0.43, in eclampsia it ranged from 1.2 - 5 mg/100 ml with a mean value of 2.52 mg/100 ml ± S.D. 0.96. The rise over normal pregnancy is highly significant in severe preeclampsia and eclampsia and not much significant in mild and moderate preeclmapsia.

21. Mean serum uric acid in mild and moderate preeclampsia ranged from 2.8 - 5 mg/100 ml with a mean value of 3.47 mg/100 ml ± S.D. 0.71, in severe preeclampsia, 4.14 mg/100 ml ± .S.D. 0.86, in eclampsia 4.7 mg/100 ml ± S.D. 0.83. The rise in mild to moderate group is not significant but is highly significant in cases of severe pre-eclampsia and eclampsia.

22. The urea level in cord blood of mild and moderate pre-eclampsia ranged from 18 - 33 mg/100 ml with a mean value of 24.18 mg/100 ml ± S.D. 4.53 in severe pre-eclampsia it ranged from 24-34 mg/100 ml with a mean value of 29.2 mg/100 ml ±S.D. 2.86, in eclampsia it ranged from 28-42 mg/100 ml with a mean value of 34.42 mg/100 ml ± S.D. 4.62. The cord blood urea increased

with severity of toxaemia and the rise over normal pregnant level is highly significant.

23. The creatinine levels in cord blood of mild and moderate pre-eclampsia ranged from 0.9 - 2 mg/100 ml with a mean value of 1.47 mg/100 ml ± S.D. 0.34, in severe pre-eclampsia it ranged from 1 - 2.5 mg/100 ml with a mean value of 1.79 mg/100 ml ± S.D. 0.4 and in eclampsia it ranged from 1.2 - 5 mg/100 ml with a mean value of 2.55 mg/100 ml ± S.D. 0.81. The increase over normal pregnancy is highly significant in cases of severe P.E.T. and eclampsia and not very significant in mild and moderate pre-eclampsia.

24. The uric acid levels in cord blood of mild and moderate pre-eclampsia has mean value of 3.37 mg/100 ml ± S.D. 0.49, in severe pre-eclampsia 3.93 mg/100 ml ± S.D. 0.74 and in eclampsia 4.63 mg/100 ml ± S.D. 0.77.This rise in cord blood uric acid in eclampsia is highly significant and less significant in severe P.E.T. but not significant in mild and moderate P.E.T.

25. The maternal mortality rate in toxaemia of pregnanty was 4.5% and infant mortality rate was 29.5% including 13.6% of still birth rate and the maximum number of death occured in eclampsia.

26. High maternal blood urea levels of 41 mg/100 ml, creatinine levels of 3.25 mg/100 ml and uric acid levels of 5 mg/100 ml heralds grave prognosis in terms of maternal mortality.

27. Umbilical cord urea levels of 34.28 mg/100 ml, creatinine levels of 3.07 mg/100 ml and uric acid levels of 5.1 mg/100 ml or more are indicative of grave prognosis for infants in terms of mortality.

28. The birth weight of new born infants in toxaemia of pregnancy tends to be decreased with increased severity of toxaemia and the umbilical cord urea level increases. Average birth weight in mild and moderate P.E.T. was 2750 gm $\pm$ S.D. 220, in severe P.E.T. 2380 $\pm$ S.D. 326 and in eclampsia 2058 gm $\pm$ S.D. 355 gm.

29. The maternal blood and the cord blood urea, creatinine and uric acid are not related to period of gestation in normal as well as toxamic pregnancy.

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APPENDIX

TABLE NO. 1

Showing urea, creatinine and uric acid levels in non-pregnant healthy females.

Sl. No.	Age (Yrs)	Blood pressure (mm Hg)	Blood urea (mg/100ml)	Serum creatinine (mg/100ml)	Serum uric acid (mg/100ml)
1.	32	120/70	28	1.2	4.0
2.	26	124/70	33	1.0	3.2
3.	28	130/76	26	0.8	3.0
4.	28	110/70	28	1.5	3.6
5.	32	106/70	32	1.2	4.0
6.	38	106/64	22	0.8	4.2
7.	36	114/80	30	1.0	4.0
8.	24	124/80	28	1.2	2.8
9.	23	120/70	27	1.0	3.0
10.	24	128/86	20	1.0	3.2
11.	27	120/66	24	0.8	3.0
12.	27	110/64	33	1.0	3.2
13.	32	112/76	18	1.0	3.0
14.	29	120/70	29	0.8	2.6
15.	32	130/80	26	1.2	2.7
16.	33	126/80	22	1.2	2.8
17.	28	120/76	18	0.8	4.0
18.	30	110/70	26	1.2	3.2
19.	27	110/70	22	1.2	2.7
20.	24	112/70	27	1.5	2.8
21.	19	106/70	18	1.2	4.2
22.	22	110/78	26	0.6	2.8
23.	21	120/76	30	0.8	3.2
24.	36	140/80	28	1.0	3.0
25.	20	120/76	26	1.0	3.8

TABLE NO. 5

Showing urea, creatinine and uric acid levels in maternal and cord blood in normal pregnancy.

Sl. No.	Age (Yrs)	Gravido	Gestational Age (Wks)	Blood Pressure (mm Hg)	Urine albumin	Oedema	Blood urea (mg/100ml)	Serum creatinine (mg/100ml)	Serum uric acid (mg/100ml)	Cord urea (mg/100ml)	Cord creatinine (mg/100ml)	cord uric acid (mg/100ml)	Birth weight (g)	Alive or dead
1.	28	4	34	112/70	-	-	16	1.5	3.0	15	1.5	3.1	2300	A
2.	24	3	36	110/66	-	-	18	1.5	3.2	17	1.5	3.2	2600	A
3.	20	1	36	124/70	-	-	22	1.0	4.0	22	1.0	4.0	2750	A
4.	19	1	34	118/70	-	-	18	0.8	3.0	17	1.0	3.2	2100	A
5.	26	3	38	120/70	-	-	14	1.0	3.2	14	1.2	3.2	2900	A
6.	20	2	37	106/80	-	-	16	1.2	3.2	16	1.2	3.2	3000	A
7.	26	3	40	120/66	-	-	18	1.8	4.0	17	1.8	3.8	3200	A
8.	28	3	38	130/80	-	-	16	2.0	3.8	18	1.8	3.8	3200	A
9.	26	2	34	120/86	-	-	20	1.0	2.8	22	1.0	3.0	2000	D
10.	27	2	34	124/70	-	-	20	1.4	2.8	18	1.2	3.0	2100	A
11.	30	4	36	126/74	-	-	19	1.2	3.2	20	1.0	3.2	2750	A
12.	22	1	36	122/70	-	-	22	2.0	2.7	19	1.8	2.8	2750	A
13.	30	2	34	130/80	-	-	25	2.0	3.6	24	2.1	3.6	2500	A
14.	29	3	36	122/80	-	-	22	2.2	4.0	22	2.2	4.0	2600	A
15.	28	1	38	124/70	-	-	19	1.2	2.8	19	1.0	3.8	3000	A
16.	24	1	40	120/64	-	-	17	1.0	2.6	17	1.2	2.6	3200	A
17.	24	1	37	126/80	-	-	16	1.2	3.0	16	1.2	3.0	3500	A
18.	25	2	36	126/76	-	-	28	0.8	2.8	26	0.8	2.7	2800	A
19.	19	1	36	124/76	-	-	22	1.2	2.8	22	1.0	3.0	2700	A
20.	18	1	36	110/80	-	-	24	1.0	2.8	24	1.2	2.8	3000	A
21.	20	2	34	112/66	-	-	20	1.2	3.2	20	1.2	3.2	2900	A
22.	28	3	36	110/70	-	-	16	1.0	3.8	17	1.0	3.6	2800	A
23.	22	1	36	110/70	-	-	14	0.8	4.2	14	1.0	4.0	2800	A
24.	19	2	34	120/74	-	-	16	0.8	4.0	15	1.0	4.0	2400	A
25.	20	1	40	124/70	-	-	22	0.6	3.6	20	0.6	3.6	3200	A

A = Alive

D = Still born

TABLE NO. 11

Showing urea, creatinine and uric acid levels in maternal and cord blood in toxaemia of pregnancy.

Sl. No.	Age (Yrs)	Gravido	Gest.Age (Wks)	Toxaemia	BP (mm Hg)	Urine Alb.	Oedema	Maternal blood urea (mg/100ml)	Cord urea (mg/100ml)	Serum Creatinine (mg/100ml)	Cord Creatinine (mg/100ml)	Serum uric acid (mg/ 100ml)	Cord uric acid mg/ 100ml)	Mode of delivery	Alive or dead	Foetal weight (g)
1.	20	1	36	E	160/110	+++	++	38	37	3.2	3.2	5.0	5.2	LSCS	D	2000
2.	19	1	36	E	170/130	+++	++	28	30	2.5	2.6	4.8	4.6	ND	A(E)	1900
3.	22	2	34	E	160/120	+++	+	28	28	1.8	1.8	3.1	2.8	LSCS	A	2200
4.	25	1	34	E	150/110	++	++	42	40	2.2	2.0	4.0	4.0	LSCS	A(E)	1800
5.	20	1	36	E	140/96	++	+	40	38	5.0	5.0	6.0	5.8	ND	D	2200
6.	30	6	36	E	180/110	+++	+	36	36	1.2	1.2	4.8	4.6	LSCS	A	2300
7.	18	1	34	E	140/100	++	-	42	42	1.5	1.5	4.0	4.2	ND	A(E)	2400
8.	30	2	36	E	160/100	+	++	36	36	2.7	2.8	4.8	4.6	ND	D	2000
9.	22	1	38	E	156/120	++	+++	36	34	2.5	2.6	4.0	4.4	ND	A(E)	2800
10.	18	1	36	E	140/100	+++	++	30	28	2.8	3.0	6.0	5.5	LSCS	A	2000
11.	24	1	37	SPE	160/104	+	+	28	28	2.5	2.0	5.0	3.2	ND	D	2300
12.	25	2	38	MPE	150/90	++	+	18	20	2.2	2.0	3.2	2.8	LSCS	A	3000
13.	22	3	36	SPE	160/100	+	++	30	28	1.2	1.0	5.0	4.8	ND	A	2700
14.	32	2	38	SPE	160/100	++	+	32	30	2.0	1.8	4.0	4.2	LSCS	A	2000
15.	22	1	40	MPE	146/96	++	-	28	24	1.5	1.2	5.0	3.8	ND	A	2600
16.	25	3	38	MPE	140/90	+	+	23	22	1.2	1.0	3.0	3.0	ND	A	3100
17.	36	1	36	MPE	150/100	+	++	33	33	1.8	1.7	4.2	3.8	LSCS	A	2400
18.	24	4	37	MPE	150/90	+	+	28	28	1.5	1.5	4.2	4.0	ND	A	2700
19.	32	2	34	SPE	160/100	++	+	27	28	2.0	1.8	4.8	4.5	LSCS	A	2300
20.	28	2	36	MPE	140/96	+	-	26	25	1.0	0.9	3.2	3.0	ND	A	3000
21.	20	1	32	MPE	148/94	+	-	22	22	1.5	1.5	2.8	3.0	ND	A	2900
22.	19	1	36	MPE	150/90	+	+	22	22	1.6	1.5	2.8	2.8	LSCS	A	2800
23.	22	2	34	MPE	140/96	+	+	28	28	1.5	1.5	3.0	3.2	ND	A	2600
24.	20	1	36	MPE	140/96	+	+	26	28	1.2	1.2	4.0	4.0	ND	A	2700
25.	28	4	40	MPE	156/90	++	++	32	34	1.5	1.4	2.8	2.9	ND	A(E)	3200

Sl. No.	Age (Yrs)	Gravido	Gest.Age (Wks)	Toxaemia	BP (mm Hg)	Urine Alb.	Oedema	Maternal blood urea (mg/100ml)	Cord urea (mg/100ml)	Serum creatinine (mg/100ml)	Cord creatinine (mg/100ml)	Serum uric acid (mg/100ml)	Cord uric acid (mg/100ml)	Mode of delivery	Alive or	Exact Foetal weight (g)
26.	30	3	36	MPE	130/96	++	+	30	30	1.2	1.4	3.2	3.0	ND	A	2600
27.	22	2	36	MPE	140/90	+	-	27	26	1.5	1.2	3.8	3.8	ND	A	2800
28.	20	1	36	MPE	140/90	+	+	24	22	1.6	1.6	4.0	4.0	ND	A	2500
29.	26	3	MPE	38	140/90	+	-	20	20	1.7	1.7	3.8	3.8	ND	A	2900
30.	29	2	MPE	36	136/94	+	-	22	20	1.6	1.5	3.6	3.6	ND	A	2500
31.	21	1	MPE	32	150/96	+	+	18	18	1.5	1.5	2.8	2.8	ND	A	2800
32.	22	2	SPE	37	160/100	++	+	32	32	1.8	2.0	4.2	4.0	LSCS	A	2800
33.	29	3	SPE	38	160/110	++	+	34	32	1.5	1.6	3.2	3.2	ND	A(E)	2600
34.	26	2	SPE	40	170/120	+	+	30	28	1.8	1.8	2.8	3.2	ND	A	2700
35.	28	1	MPE	36	130/90	+	+	28	26	2.4	2.4	4.4	4.2	ND	A	2500
36.	26	2	SPE	28	156/100	++	+	32	34	2.5	2.5	5.2	5.2	ND	D	1800
37.	28	3	SPE	36	160/102	++	-	30	28	1.8	2.0	4.0	3.8	ND	A	2200
38.	26	1	SPE	37	154/100	++	+	26	24	1.4	1.4	3.2	3.2	ND	A	2400
39.	26	2	MPE	38	156/90	+	-	22	20	1.2	1.2	3.6	3.6	ND	A	2700
40.	20	1	E	34	160/110	++	-	34	34	2.6	2.5	5.0	5.0	ND	D	2100
41.	28	1	E	36	140/100	++	-	32	30	2.2	2.4	4.8	4.8	ND	D	2000
42.	28	3	MPE	36	140/90	+	+	26	24	2.0	1.8	322	3.2	ND	A	2500
43.	20	1	MPE	36	138/96	+	-	22	22	1.6	1.6	3.0	2.8	ND	A	2700
44.	25	2	MPE	38	140/94	+	-	20	18	1.2	1.0	2.8	3.0	ND	A	3000

E = Eclampsia
MPE = Mild & moderate preeclampsia
SPE = Severe preeclampsia
A = Aliv
D = Sm Still born
A(E) = Alive but expired within 24 hrs.
ND = Normal delivery.